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Diversified Application of Powdered Coal

The Pulverized Fuel Distributed by Compressed Air to Sub-Stations and Used in Open-Hearth, Annealing and Other Furnaces

— BY CHARLES LONGNECKER —

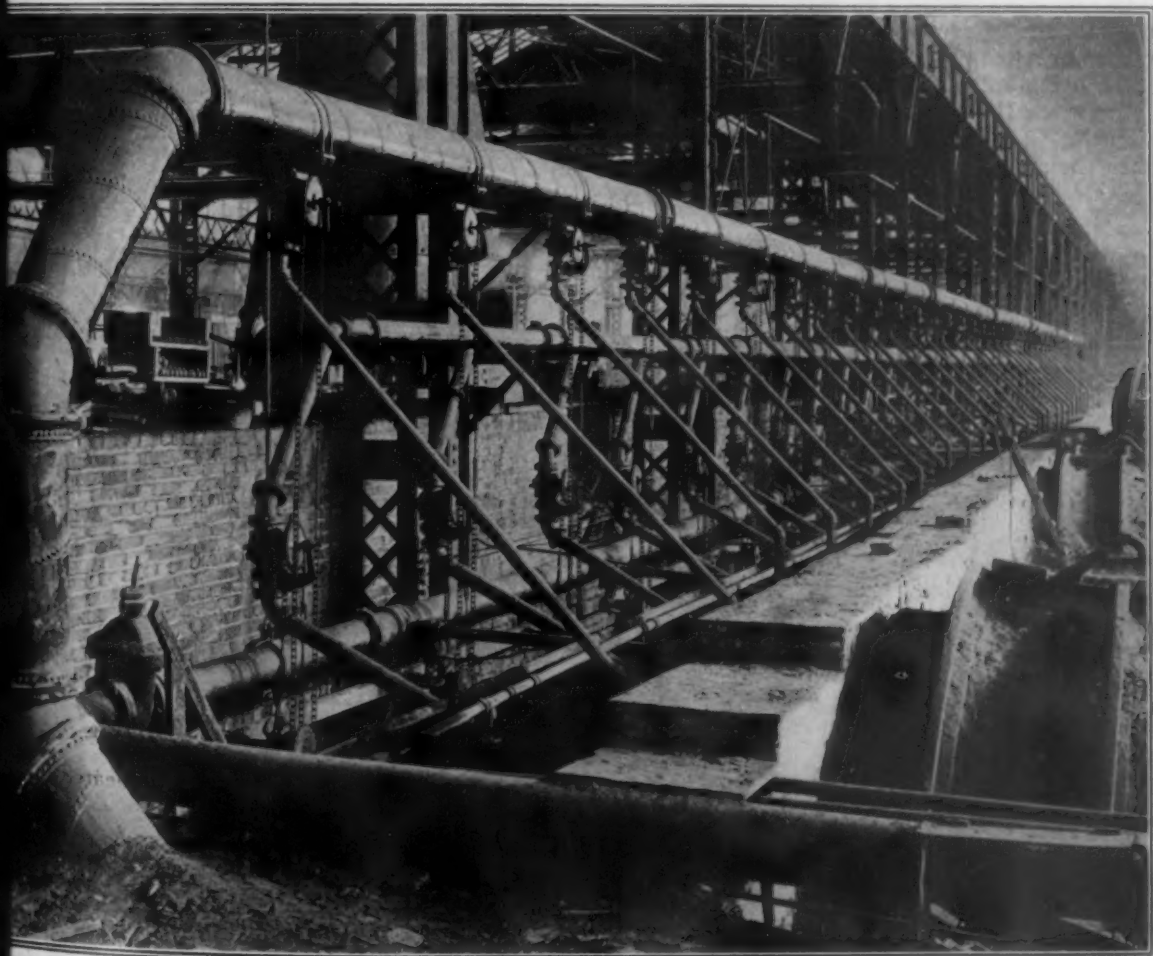
HERE is at the present time unquestionably the greatest need for fuel conservation ever known in the country's history. Confronted by prospects of a scarcity of available fuel, intrinsically attached to any methods of burning whereby more economical results can be attained. With this in view, many engineers are looking for any improvement which will lead out of their difficulties.

It is in this connection that a description of the powdered coal installation at the Pressed Steel Car

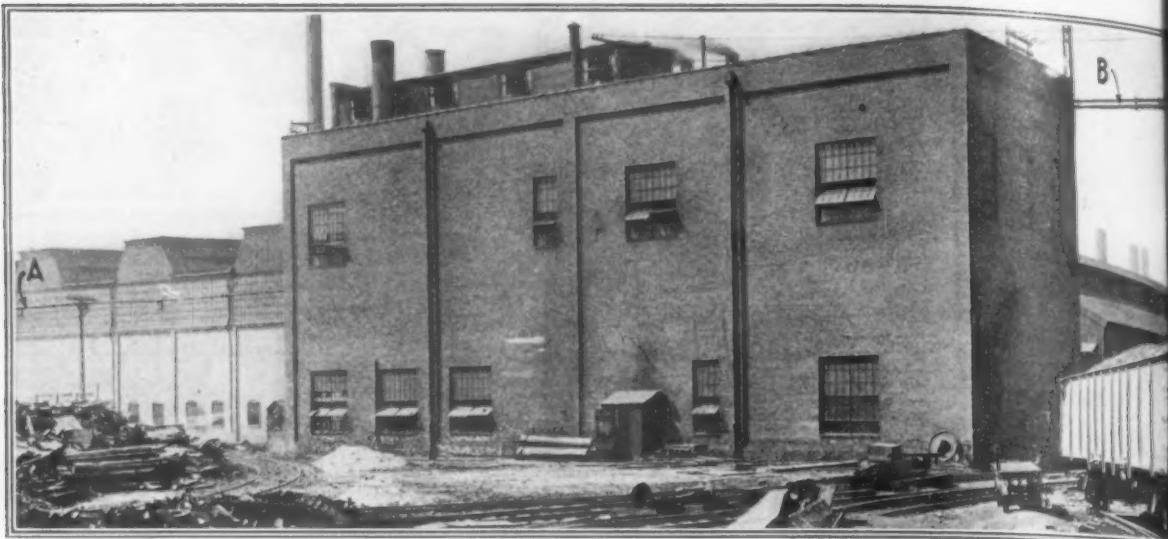
Erecting Engineer Bonnot Co., Canton, Ohio.

Co.'s works at McKees Rocks, Pa., which is the largest and most diversified application of this fuel at any one plant in the country, or, in so far as we are informed, in the world, is presented. Here the rapidly failing supply of natural gas, concurrent with an increase in the price of fuel oil, made necessary the adoption of another fuel because of the quantity used. After careful investigation by the company's engineers powdered coal was selected and erection of the plant started in the autumn of 1917.

Probably the most interesting features at this plant are the use, for the first time, of sub-stations and application of coal to the many varied types of



Row of 18 Annealing Furnaces Supplied with Powdered Coal. The upper pipe carries the coal dust and the lower the secondary air. The valves are operated from the floor through pull chains



From the Main or Coal Pulverizing Station the Powdered Fuel Is Forced to Substations by Compressed Air in 3-in. Pipes as at A and B

furnaces. Seven departments are served, namely: malleable and steel annealing, open hearth, forge shop, rivet shop, spring shop, miscellaneous order and plate pressing.

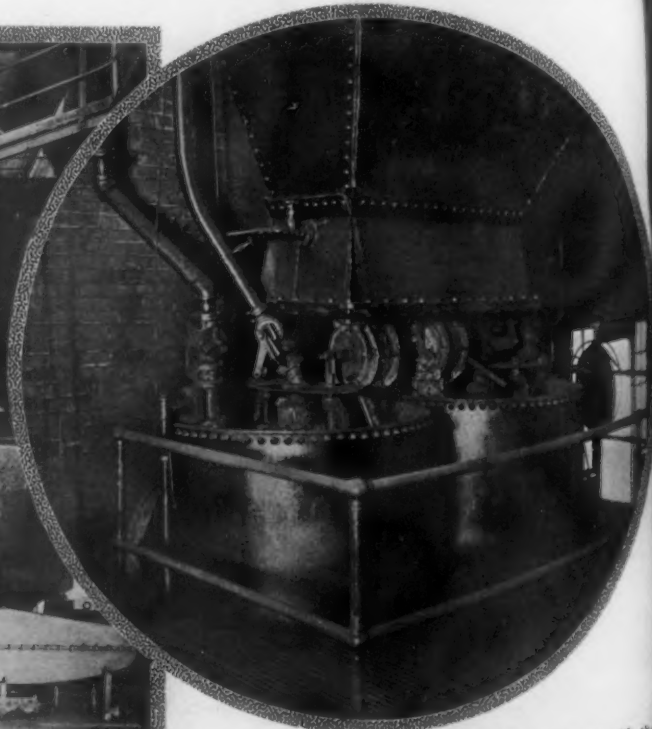
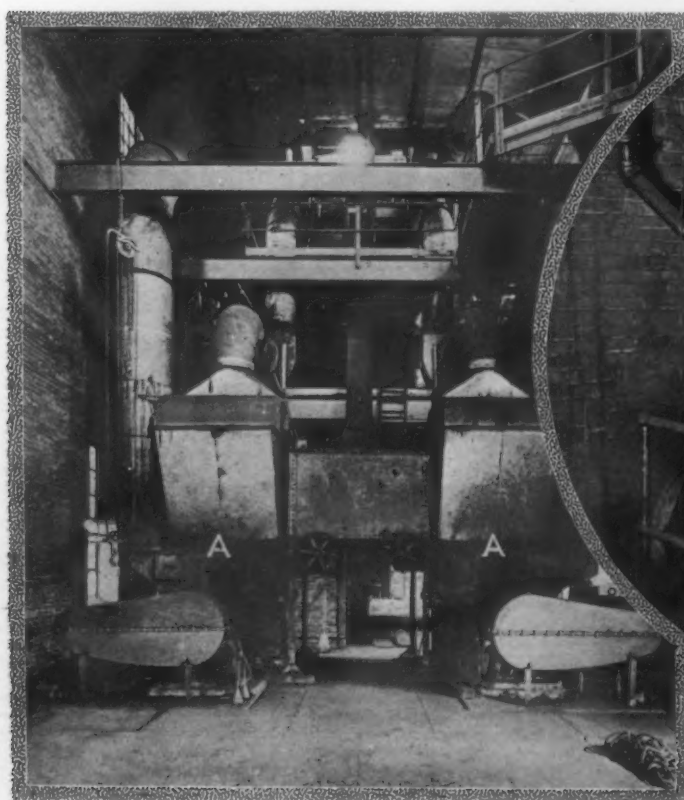
The buildings housing these departments are scattered throughout the plant, which covers about 100 acres, so that it was necessary to devise a system for distributing the powdered coal to each building. This was done by establishing a main station and six sub-stations, the latter being located in or nearby the building to which coal was to be furnished.

The raw coal is received from the cars, dried and pulverized at the main station, from which a 3-in. pipe line leads to each sub-station. Through these lines the powdered coal is conveyed by means of compressed air. The length of the longest line is 1150 ft., and, judging from the success attained in carrying the coal this distance, there is no question that it could be successfully carried much further should it be desired. Thus it is evident that by this system of distribution a large area can be

covered, besides simplifying the installation and greatly reducing the initial cost.

The design of each sub-station is identical. It contains the necessary collectors for receiving the coal when delivered through the 3-in. line; a 25-ton bin into which the collectors deposit the coal; a fan of the improved Bonnot type, and an automatic air and coal regulating device. The function of this device is to maintain the proper proportion of air and coal in the Holbeck distributing system which furnishes the coal to the burners. The maintenance of a correct ration of air to coal is absolutely necessary, as on this depends the ability to hold an unvarying and uniform temperature in the furnace. The regulation, which experience has proved to be accurate, is controlled through electrical means.

The parts entering into the construction of steel cars being so diversified, it can readily be appreciated that the types of furnaces used in the production of these parts must likewise cover a wide range both in design and in temperature carried. There are furnaces used for melting, annealing

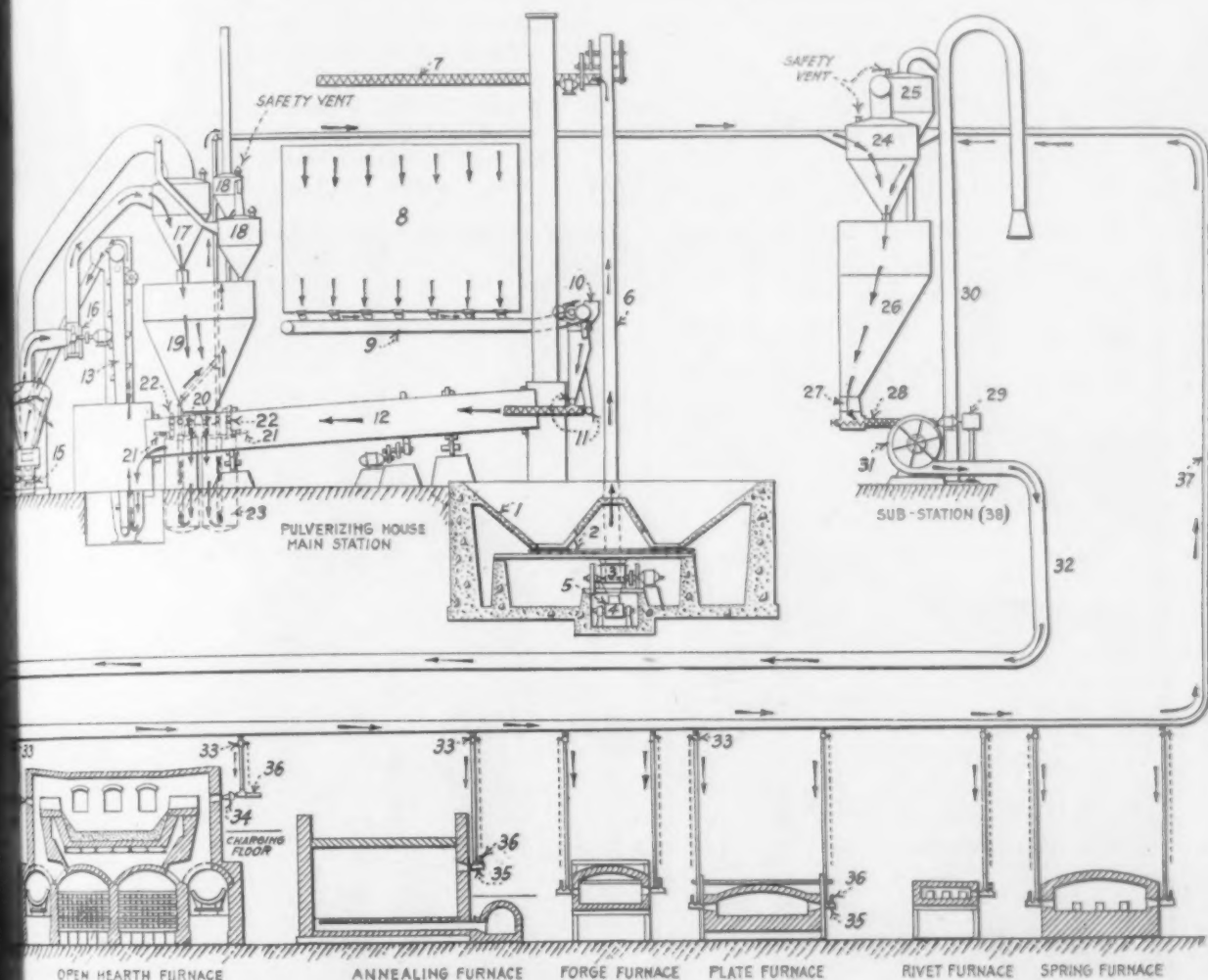


At the Left Are the Pulverizers A Together with the 5-Ton Bin Supplying Them. The picture at the right shows the top of the ejector tanks from which the coal is discharged by compressed air, the air being admitted at the top and forcing the coal through a pipe starting from a point near the bottom

welding, forging, bending, rivet and plate heating and for forming springs. Temperatures for these operations vary from 1500 deg. Fahr. in some furnaces to 2900 deg. in others. The smallest furnace has a hearth area of 13½ x 18 in., while the largest

only one furnace—the open-hearth—was it necessary in applying the powdered coal to alter the construction. In all others the only change was in the type of burner.

The main station to which reference has been



SCHEME OF THE POWDERED COAL SYSTEM AS INSTALLED IN PLANT OF PRESSED STEEL CAR CO.

- 1—Track hopper
- 2—Reciprocating feeder to feed coal from the track hopper to coal crusher
- 3—Coal crusher to receive coal from the reciprocating feeder
- 4—Belt conveyor to deliver coal from the coal crusher to the bucket elevator
- 5—Stationary magnetic separator over the belt
- 6—Centrifugal discharge bucket elevator
- 7—Distributing screw conveyor with flights, to receive coal from the elevator and distribute it in the bin
- 8—5-ton dried coal storage bin
- 9—Bonnot coal pulverizers complete with vacuum separator
- 10—Mill exhauster to exhaust pulverized coal from the separator and deliver same to the collector
- 11—Pulverized coal collector above 25-ton bin
- 12—Auxiliary pulverized coal collectors
- 13—Pulverized coal storage bin
- 14—Special outlet castings with valves to let pulverized coal into ejector tanks
- 15—Compressed air line
- 16—Vent line
- 17—Ejector, which delivers pulverized coal to the various substations through a 3-in. pipe line by means of compressed air
- 18—Pulverized coal collector, at sub-station, which receives pulverized coal from the ejector
- 19—Auxiliary collector
- 20—25-ton capacity pulverized coal storage bin
- 21—Special outlet casting to support feed screw
- 22—Special feed screw, for feeding coal to the distributing system
- 23—Automatic regulator which automatically controls the speed of the variable speed motor that drives the feed screw, thus to feed the pulverized coal in proportion to the amount of air flowing through the distributing system
- 24—Vent pipe with top bent down to prevent its acting as a flue and thus producing suction on the system which might draw flame into the pulverized coal main if blower should be stopped for any reason
- 25—High pressure distributing blower, to furnish the necessary air for distributing the pulverized coal to the furnaces
- 26—Pulverized coal main to furnaces with branch lines to burners
- 27—Valve for regulating the flow of pulverized coal to the burner
- 28—Special burner for open-hearth furnaces
- 29—Cast iron water cooled burner
- 30—Air blast line to deliver secondary air to form the proper mixture for burning pulverized coal
- 31—Return main to take surplus pulverized coal and air mixture to pulverized coal collector which deposits the unused coal into 25-ton pulverized coal storage bin
- 32—At McKees Rocks plant there are five substations, which are substantially the same as shown, one for annealing furnaces at foundry and one for open-hearth furnaces at foundry, one for forge plant, spring and rivet shops, one for miscellaneous order department and one for plate heating furnaces in pressing department. The mixture of air and pulverized coal in coal distributing main is 1 lb. of pulverized coal to 63 cu. ft. of air. The mixture of air and pulverized coal when burning in furnaces is 1 lb. of pulverized coal to about 230 cu. ft. of air

the open-hearth furnace. In the forge shop there are furnaces with one small burner, but here most have two opposing burners. The large plate heating furnaces are equipped with six burners of large size. Mention should be made of the fact that in

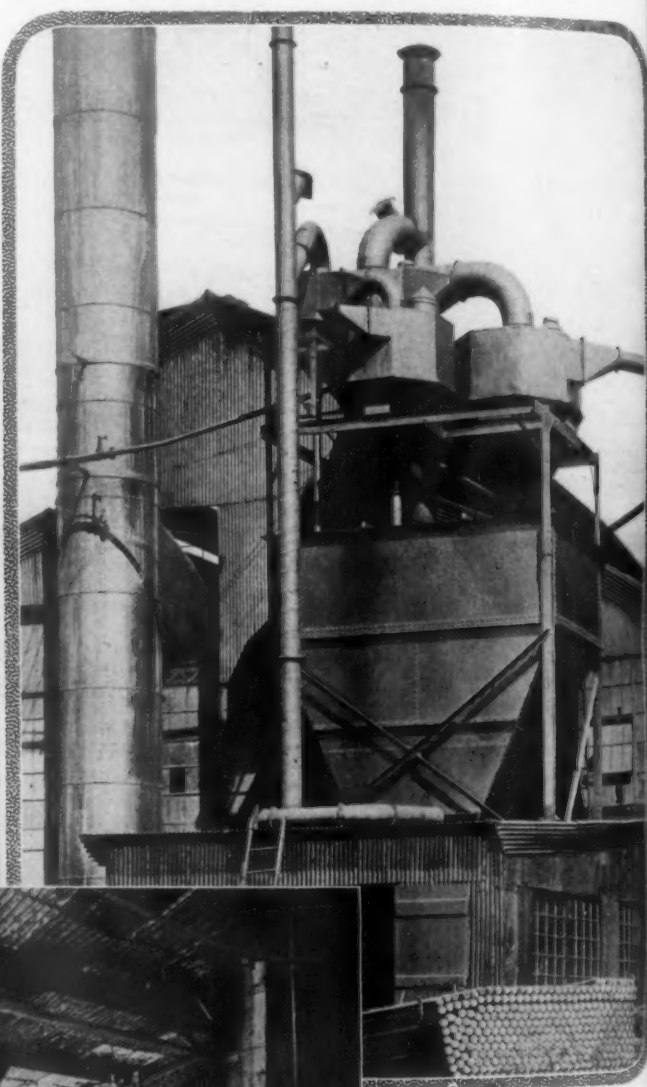
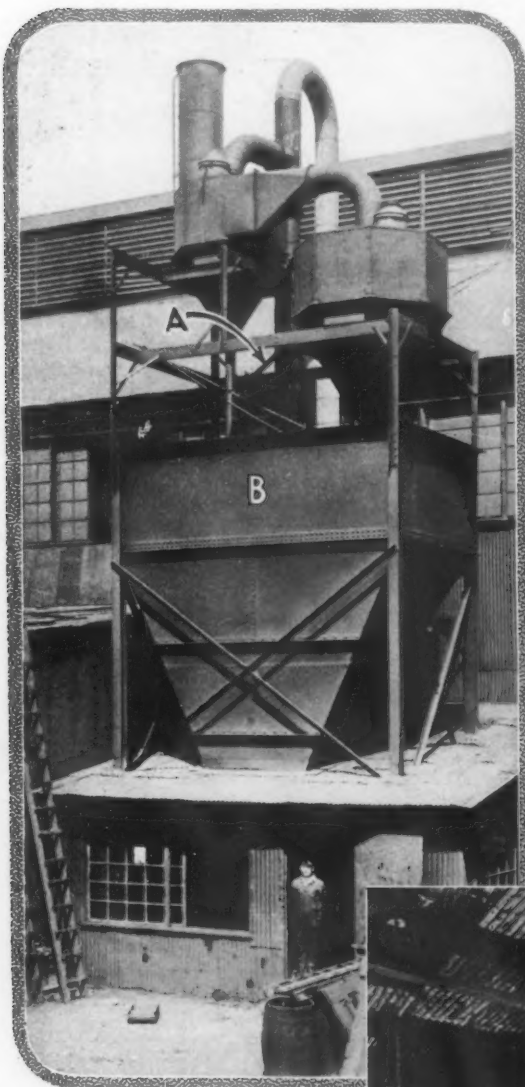
made is as centrally located as possible in relation to the sub-station. It contains the machinery required to prepare the coal. The building is of brick construction, 115 ft. 4 in. long by 30 ft. wide. The coal when dumped from the car is received by a

reinforced concrete hopper, from which it is fed into a 24 x 30-in. roll crusher. From here it is passed on a belt under a high power magnet, which removes any intermixed steel. The discharge from the belt is made into an elevator, which empties into a screw conveyor, and this in turn into a 300-ton bunker. There are two compartments in this bunker—one of 100 tons and one of 200 tons capacity, so that it is possible to store coal of different analyses. The advantage of this is apparent when consideration is taken of the fact that the open-hearth furnace may require a different grade of coal than that required for other furnaces.

A second belt conveys the coal from this bunker

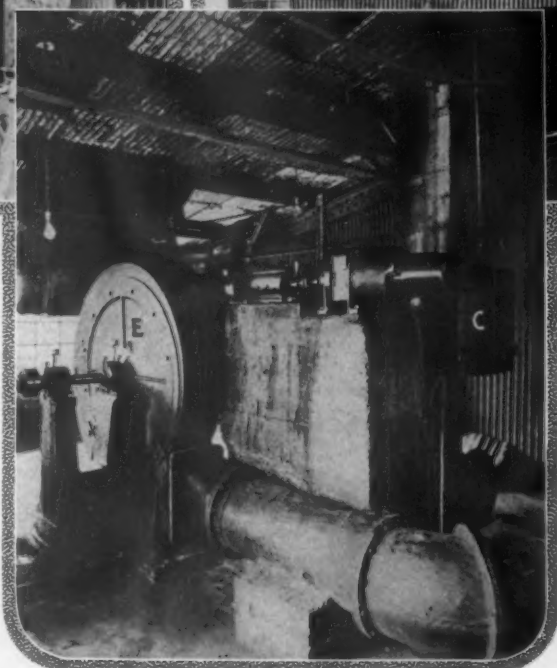
hour so that 95 per cent will pass a 100-mesh screen and 85 per cent through a 200-mesh screen. Integral with the pulverizer are vacuum air separators. An air current carries the fine coal to a series of collectors located over 25-ton bins.

The ejector tanks are placed beneath each bin and it is from these tanks that distribution is effected through the 3-in. lines to the individual sub-stations. Each tank holds 4 tons of powdered coal. With compressed air at 35 lb., it has been found possible to fill a tank and deliver the coal to the sub-station in 8 min. Connections for compressed air and powdered coal lines are made to the tank through valves. All machinery is electrically driven.



to an automatic recording scale, from whence it passes into the dryer. The capacity of this dryer is 10 tons per hour with coal containing a high percentage of moisture. The construction of the furnace for supplying heat to dry the coal is such that no flame is drawn into the dryer shell, so that danger of setting coal on fire is avoided.

Following the dryer are the pulverizers. There are two of these, each having a capacity to pulverize 5 tons of coal per



Two of the Substations for Delivery Coal. At A is the 3-in. coal line entering the collectors; B is the 25-ton bin; C is the regulating device, and E is the distributing fan

Provision has been made for a future installation of a 10-ton dryer and two 5-ton pulverizers.

There are probably few plants where the furnace requirements will demand a greater flexibility of fuel control than those at this plant. Here in the malleable annealing furnaces a uniform and constant temperature must be held for seven days. Compared with this department the furnaces in the forge shop operate more intermittently. One furnace may require a weld-

ing heat, while another nearby may only need a low heat for bending; also the sizes of hearths, etc., are frequently changed to suit changes in the work to be performed. In the spring shop, where high carbon steel is heated, a "mellow" soaking heat is demanded. The conditions are being successfully met with powdered coal as fuel, so that from the standpoint of heat requirements the field is well covered.

In the forge shop, miscellaneous order department and rivet and spring shops exhaust systems have been installed. These take care of the waste gases and fine ash, which they carry in suspension so as to prevent the air in the shops being contaminated.

The open-hearth furnace, which is now being built, is designed especially for the burning of powdered coal, as well as natural gas or fuel oil. It is expected that this will be in operation during the month of September.

The accompanying drawing shows in diagram form the complete powdered coal installation, with key numbers which are self explanatory of the system.

The system as installed is known as the Holbeck system, as designed by A. A. Holbeck, and was manufactured by the Bonnot Co., Canton, Ohio.

Some of the results obtained with powdered coal are as follows:

Pyrometer readings taken on the annealing furnaces showed a uniform reading 1600 deg. Fahr., while the variation for the week's annealing on malleable castings has been 1600 deg. to 1640 deg. Fahr. Natural gas required 20 to 25 hr. to bring the furnace up to 1600 deg. With powdered coal it requires but 12 to 15 hr. to do the same work. The size of furnace is 9 ft. 8 in. by 18 ft. 3 in. by 7 ft. 6 in. deep, and it is equipped with two burners, which burn approximately 80 lb. per hour each to maintain a temperature of 1600 deg.

Total fuel cost per month is as follows:

Natural gas, 14,000,000 cu. ft. at 35c. per 1000	\$4900
Fuel oil, 105,000 gal. at 8c.....	8400
Powdered coal, 525 tons at \$5*.....	2625
(*\$5 includes cost of coal, labor, power, etc.)	

HEAVY ARTILLERY IN FRANCE

Production of Other Guns—Ordnance Department to Spent \$12,000,000,000 in Second Year

The following facts have been authenticated and are released for publication by Harvey O'Higgins, associate chairman, Committee on Public Information, Washington:

When we declared war against Germany, the military authorities of Great Britain and France offered to provide our expeditionary forces with big guns in order to save our ship tonnage from the burden of transporting heavy ordnance and to keep at a maximum production the ordnance works abroad.

France and Great Britain had an adequate force of skilled workmen for making heavy ordnance and we had not. In this country all the factories that could make the large machine tools necessary for turning, boring and pressing big guns were already busy on contracts for the Allies. In order to prevent a congestion in allied plans, to save ship tonnage, and to make wise use of such arsenals and workmen as the Allies had, our War Department agreed to accept as much as possible of its first year's supply of guns abroad and to devote that year to developing its own big-gun industry.

The program has been carried out successfully. Our forces in Europe have had a sufficient supply of guns and ammunition purchased in Europe. Our men in the trenches have had the same heavy ordnance protection that the French and British troops have had. We have sent over some heavy artillery to supplement the allied supply. And we have developed our own designs, built our own factories, installed our machines and trained our own workmen for the manufacture of all sorts of big guns.

We have spent \$5,000,000,000 on ordnance in our first year. We are planning to spend \$12,000,000,000 in our second.

The complaint has been made that our ordnance bureau lost six months in vain efforts to improve on the perfect recoil mechanism of the famous French 75's. That is untrue. The charge is due apparently to the fact that we prepared designs for an American 6-in. gun which was put into production before the models for the 75 arrived from France. We are making both guns, and our contracts call for the delivery of more than 3000 of them by January, 1919. After that date the 1917 model of the French 75 will be manufactured here at the rate of about 500 a month. And our own new gun, with the "split" carriage, is more flexible even than the French 75, and more deadly, therefore, to the enemy.

Of the 6-in. sea coast gun, our contracts provide for the delivery of 400 by January, 1919, and of 200 a month thereafter. Of the 155-mm. howitzer, 1500 are to be

delivered by January, 1919. Deliveries of the 240-mm. howitzer are reaching 100 a month.

We have produced, in the light and heavy Brownings, the best machine guns in the world, and we are making them at the rate of about 5000 a week. The new American rifle is admittedly an improvement on any of the Allies' rifles and far superior to the enemy's. We are turning them out at the rate of 60,000 a week. Our automatic pistol, calibre 45, has defeated the Germans in close fighting. All these weapons are being produced in vast quantities, and our ordnance division, that was cartooned and scoffed at as the joke and failure of the war, has proved itself as resourceful as the men whom it has armed and as efficient as the weapons with which it has armed them.

Low Accident Record

WASHINGTON, Sept. 10.—The United States Employees' Compensation Commission has issued a special report on the low accident record maintained during the construction of the United States explosive plant C, at Nitro, W. Va. The building began in January, 1918. The record, says the report, has proved the value of forethought and careful planning in the elimination of accident hazards through concerted effort in modern safety engineering.

No entries in the United States accident statistical record books equal those shown at this Government powder plant, where, to date, there has been only two-tenths of 1 per cent of the number of working hours lost by injuries resulting from accidents causing absence of employees.

Only six fatalities have occurred at this plant during the past eight months of its construction period, where upward of 19,000 employees have been working overtime and Sundays to complete this gigantic project. Eight accidents per 10,000 employees per day have occurred, entailing loss of one day or more.

The supervision of this accident-prevention work has been done by a well organized safety department which, representing the United States Employees' Compensation Commission at Washington, D. C., has been under the direction of C. B. Hayward, safety engineer in charge.

W. L. C.

A report on the metric system in export trade made to the American Society of Mechanical Engineers by its committee on weights and measures is printed in the September *Journal* of the society. The report is based on some 1400 answers to a questionnaire which was sent to several thousand manufacturing concerns in the United States, some or all of whose product is shipped to countries which are supposed to use the metric system. The conclusion is that the country's export trade is conducted by the English system.

MAKING FERROMOLYBDENUM

Its Production in the Electric Furnace—Molybdenum in Steel

There is a lack of general knowledge as to the metallurgy of molybdenum, particularly its function in steelmaking. The developments in this have been quite rapid and extensive as the war has progressed. Late information is contained in a paper, "The Manufacture of Ferroalloys in the Electric Furnace," to be read by Robert M. Keeney at the meeting of the American Institute of Mining Engineers at Denver, Col., in September. The portion treating of molybdenum is as follows:

Colorado the Largest Producer

The use of ferromolybdenum in the metallurgy of steel is in its infancy. Previous to 1914, probably not over 10 tons was produced yearly in the United States, practically all of this being exported; but with the high price of tungsten, search for molybdenum ores became more active, and now several hundred tons of the alloy per year are made in this country, practically all of which is exported. The alloy has not been widely used because of the supposed scarcity of ore, and the prejudices of American steel manufacturers against it, owing to difficulties encountered in its use in steel. The scarcity of ore has been overcome, and at present Colorado is the largest producer of molybdenum in the world. The prejudices of American steel manufacturers have not, however, been overcome.

Ferromolybdenum was made from roasted molybdenite in the crucible before the introduction of the electric furnace, but can now be made directly from raw sulphide in the electric furnace. Another source of molybdenum is lead molybdate, wulfenite, which is fused with soda ash and carbon to produce lead bullion and sodium molybdate slag. The slag is then smelted in the electric furnace, with carbon as a reducing agent, and suitable fluxes, to produce ferromolybdenum.

The standard grade of ferromolybdenum is not well established. Some manufacturers make a product containing 50 to 80 per cent molybdenum and 3 per cent carbon and manage to sell it. Others, by different methods, make a product containing less than 1 per cent carbon. A great deal of ferromolybdenum containing 0.25 per cent sulphur has been sold but most consumers will not accept a product containing over 0.1 per cent sulphur. Ferromolybdenum containing 80 per cent molybdenum has a dull gray iron color, coarse structure, high density, and is non-magnetic. It does not break easily.

Production in the Electric Furnace

Raw materials used in preparation of ferromolybdenum may be: For ore, the sulphide, molybdenite, or sodium molybdate slag made from wulfenite; for reducing agent, some form of carbon, or 90 per cent silicon metal ground to pass 60 mesh; for fluxes, lime and fluorspar. There are two methods of manufacture:

1. Reduction with carbon and excess of lime, according to the reaction:



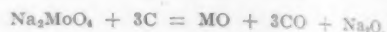
Pure molybdenite contains 60 per cent molybdenum and 40 per cent sulphur. According to the above reaction, 100 parts of molybdenum are reduced from 170 parts of molybdenite by 18.8 parts of carbon. For every 100 parts of molybdenum, 58 parts of lime are necessary for slagging the sulphur as calcium sulphide. This reaction works out closely to the theoretical, and there is no difficulty in making a product with about 0.1 per cent sulphur; the product will contain 1.3 to 3 per cent carbon. If a lower-carbon alloy is desired, the crude metal is broken up and refined with an oxidizing slag of iron ore. The amount of iron in the alloy is varied as desired by the addition of iron turnings in the smelting furnace, or of iron oxide in the refining furnace.

2. Reduction with silicon metal, according to the reaction:



This method has been used recently in the production of 50 per cent ferromolybdenum, although when the grade is being made ferrosilicon may be used. Lime is sometimes added to help slag the sulphur as calcium sulphide. By this method, the production of 100 parts of molybdenum requires 29 parts of silicon.

When sodium molybdate slag is the source of molybdenum, reduction takes place according to the reaction:



The use of sodium molybdate requires considerably more power than the other reactions, because very little reduction occurs until all free soda salts which may be in the slag are driven off. The regular grade of sodium molybdate slag used for this purpose contains 30 to 40 per cent MoO_3 . In all electric furnace work the presence of sodium salts interferes with the speed of the reactions.

The average wulfenite* from which ferromolybdenum is produced contains: MoO_3 , 16; lead, 50; SiO_2 , 6; FeO , 11.0; CaO , 2.0; arsenic, 0.8; phosphorus, 0.05 per cent. This concentrate is smelted in a circular, water-jacketed lead blast furnace with coke and soda ash to produce lead bullion and molybdenum slag. The slag contains: MoO_3 , 33; lead, 1.0; SiO_2 , 11 to 14; FeO , 15; CaO , 7; arsenic, 1.0; phosphorus, 0.1 per cent; remainder, soda. This molybdenum slag, crushed to about $\frac{1}{2}$ in., is smelted in single-phase electric furnaces of the Siemens type, lined with magnesite, to produce ferromolybdenum. The charge is calculated to a monosilicate slag, using lime as a flux. Iron ore is added to produce an alloy containing 60 to 65 per cent molybdenum, and residues from an oil-gas plant are used for reducing agent.

The average power consumption is 7 to 7.5 kw.-hr. per pound of molybdenum produced. The recovery varies from 78 to 80 per cent, with a loss of 10 per cent in slag, and about 10 per cent mechanically and by volatilization.

Analysis of Ferromolybdenum Made from Sodium Molybdate Slag

	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
Molybdenum.	61.0	62.34	66.96	64.78	62.35	61.9
Carbon	2.31	2.214	2.03	1.51	1.91	1.2
Silicon	0.41	...	...	...	...	...
Phosphorus .	0.086	0.018	0.029	0.018	0.040	0.1
Sulphur	0.098	0.075	0.060	0.022	0.049	0.1
Arsenic	1.10	...	...	...	...	...
Copper	0.018	...	...	...	...	...
Manganese ..	0.2	...	...	...	...	...

Ferromolybdenum containing 80 per cent molybdenum and under 1 per cent carbon cannot be regularly tapped from the electric furnace because of its high melting point, so that when this grade of alloy is to be made, the furnace must be of the knock-down variety for removal of the button. The slag is tapped off, and when this operation is finished the metal is dug out. A 50 to 60 per cent, low-carbon product can be tapped, and a considerable quantity of this grade is made in tapping furnaces.

Molybdenum in Steel Manufacture

Ferromolybdenum is added to steel as a fixed addition, nearly all of the molybdenum remaining in the steel. It is supposed to give the steel properties similar to those of tungsten steel, but only one-third to one-half as much molybdenum is necessary; that is, where regular high-speed steel contains 18 per cent tungsten, 6 to 9 per cent of molybdenum may be substituted. However, it gives these properties only when the addition is properly made and proper heat treatment follows. The regulation of these factors caused so much trouble and expense that, in this country, the manufacture of molybdenum high-speed tool steels has been practically discontinued for several years. It is used for this purpose abroad, however, to a considerable

*Alan Kisson, manager Molybdenum Products Co., Tucson, Ariz.; personal correspondence.

ent. At the present time it is mainly employed in steel as an auxiliary rather than as a major constituent.

Various reasons have been assigned for the discontinuance of the use of molybdenum in these steels. It has been found that molybdenum in rapid steels caused irregular performance; that steels of the same composition and having had seemingly the same treatment showed large variations in their maximum cutting speeds. A manufacturer has stated that the ingots crack in quenching, the tools crack on quenching, and molybdenum tends to volatilize from the steel when heated; the latter might be due to the production of molybdenum oxide, which is much more volatile than the metal itself. When small quantities of molybdenum, say 0.25 per cent, are added, the elongation and elastic limit of the steel are greatly increased. When molybdenum is combined with nickel, the resistance to shock is increased without diminishing the elongation. Its utilization for the making of big guns was originated by the Germans. It is such success that the Allies are said to use it now for the same purpose. This may account for the heavy use of molybdenum.

President Wilson Removes Restrictions in Purchases

WASHINGTON, Sept. 9.—Efforts of Congress to restrict purchases from private manufacturers under the War Reliance Act appropriations bill have proved impossible of execution, and President Wilson has exercised the prerogative given him by the measure of waiving the restriction. The measure carried cash appropriations of \$14,000,000 and authorized contracts for \$2,623,000, more, a total of \$5,437,000,000. The bill was approved July 8, 1918. The restriction was contained in the following proviso:

That except as expressly otherwise authorized herein, no part of the sums appropriated by this act shall be expended in the purchase from private manufacturers of any material at a price in excess of 25 per centum more than the cost of manufacturing such material by the Government, or, where such material is not or has not been manufactured by the Government, at a price in excess of 25 per centum more than the estimated cost of manufacture by the Government; provided, that whenever in the opinion of the President the situation is such as to justify such action, he may waive the limitations contained in this section.

The President has issued a formal executive order, waiving this provision, and declaring:

Whereas, in view of the practical impossibility under existing conditions of making the estimates necessary to comply fully and adequately with said provisions, it appears that the situation is such as to justify a waiver of said provisions, it is hereby ordered that during the present national emergency, the limitations contained in the above section and the same are hereby waived.

Safety First Pedestal for Induction Motors

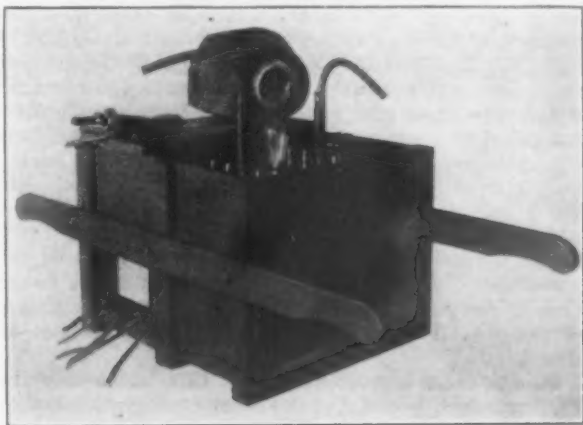
The General Electric Co., Schenectady, N. Y., has developed a pedestal type of panel for controlling alternating-current motor circuits in capacities up to 300 hp. and 2500 volts. The apparatus mounted on the pedestal includes a circuit breaker and transformers in a housing for the disconnecting switch and space for instruments is provided. The circuit breaker and disconnecting switch are interlocked so that the switch cannot be operated except when the breaker is open and provision is made to prevent accidental contact with the live parts of the apparatus.

The Quigley Furnace Specialties Co., New York, is supplying a powdered coal plant for the Whitaker Lumber Co., Beech Bottom Works, W. Va., capable of burning 4 tons of powdered coal fuel per hour to supply 20 furnaces for heating 6-in. shell forgings. The equipment is to be arranged for large extensions for future applications in other departments in the plant, including the boilers.

New Electric Arc Welding Apparatus

A special apparatus designed to enable alternating current to be used for the cutting and welding of metals by the electric arc has been brought out by the Electric Arc Cutting & Welding Co., 222 Halsey Street, Newark, N. J. Any of the ordinary primary voltages of alternating current can be used as well as any of the standard transmission systems. As the machine can be taken directly to the point at which the work is to be done, if it is found desirable, the expense of wiring is consequently reduced.

The machine which can be supplied in three types for cutting, welding, and cutting and welding consists of a special transformer with no moving parts. An easily moved shunt in the magnetic circuit is provided



In a New Alternating-Current Machine a Special Arrangement of Plugs and a Shunt in the Magnetic Circuit Enables the Heat Required in Electric Arc Welding and Cutting Operations to Be Varied to Suit Conditions of Metal, Temperature, etc.

to enable the operator to take care of conditions requiring different amounts of heat at varying temperatures. This is supplemented by a series of taps terminating in plugs on the top of the machine over which the terminals are slipped. As the complete 60-cycle machine weighs in the neighborhood of only 200 lb. two men can carry it to any location in the shop where work has to be done and place it on a bench or on the floor under the bench. Another point upon which emphasis is laid in connection with the portability of the machine is the fact that it will operate in any position either upside down or on its side.

The machine can be supplied for any voltage of alternating current although from the standpoint of safety a maximum of 650 volts on the primary side is recommended. Machines for operation on single-phase, three and four-wire, two-phase and three-phase power systems or across the outside wires of the two-phase system can be supplied. In connection with the polyphase circuit it is recommended that a single-phase machine be distributed among the several phases to obtain an approximate balance of current, although a machine which will take power from a polyphase circuit and deliver single-phase welding current can be furnished.

Hongkong Tin Market

WASHINGTON, Sept. 10.—The Hongkong tin market did a record-breaking business in the first six months of this year, according to the report of Consul A. E. Carleton. The declared exports showed total shipments of 14,981,907 lb. valued at \$9,628,228 against 9,112,931 lb. valued at \$3,035,986 in the first six months of 1917, and 5,282,828 lb. valued at \$1,122,242 in the first six months of 1916.

So far as Hongkong prices are concerned, 1918 may be considered as a record. The price per picul in the middle of May reached \$182 Mexican, and when the year began the price was about \$103 per picul. At the end of June, the price in Hongkong stood at about \$134. The stock of tin in Hongkong was very low in June, and as a result very little business was done.

All Available Steel Must Be Used

War Industries Board Will Take Vigorous Action, if Necessary—Closer Supervision of New Construction—Congested Housing Conditions

WASHINGTON, Sept. 9.—The retrenchment on iron and steel throughout the country has not yet gone deep enough to assure the unhindered completion of the nation's great war program. For this reason, new efforts are being made daily by the War Industries Board, not only to check the non-war use of steel but to make every possible cut, even in essential needs.

Just now a national inventory is being made of every ton of iron and steel in the hands of manufacturers throughout the country, as stated in THE IRON AGE of Sept. 5. Because the War Industries Board had no machinery which could meet so vast a problem, it turned the matter over to the Census Bureau. That organization is capable of coping with it. It immediately sent questionnaires to 40,000 manufacturers, asking them to turn in complete reports of their stocks. But this is only the first step. A mere inventory of steel on hand would net the War Industries Board little. Behind it there is to be action. The steel must be put to war use. For this purpose the War Industries Board is ready to set in motion the machinery of commandeering whatever stocks can be put to better use in other hands.

So far there has been little of this. Not only the War Industries Board, but the other conservation bodies in Washington have been able to accomplish their purposes by mere requests. But where requests fail there will be more vigorous action. The War Industries Board will have little less mercy on an unused steel supply and putting it into the war than the War Department has in conscripting a non-essential worker and putting him into the Army.

Necessary for War Purposes

"We must have the steel to carry out the war program," said Chairman Baruch of the War Industries Board in outlining this need, "just as the General Staff must have men to send to General Pershing. The demands for the war program, here as well as in Europe, are growing every day, and we must meet them. There will be no shirking. The steel men have promised us their support, and they will carry out their promise. But wherever we find that there is a supply of steel or of iron needed for war purposes, and not being used for such purposes, we shall have no hesitancy in recommending that it be commandeered. I have said it again and again, and it cannot be repeated too often, that the nation must awake to the fact that we must make sacrifices and suffer real deprivations if we are to do the work of this war. But I am sure the nation is ready to do everything that is demanded."

Another step which the War Industries Board has taken to insure a greater conservation of steel has been to tighten the screws on construction. For a long time it has declined to authorize new buildings anywhere except to meet the most urgent of war demands. New post offices and other similar Federal buildings long since were put under the ban. Even school buildings, except where they had to be constructed for replacement purposes, were similarly forbidden.

New Buildings

"One school building during the war must do the work of two," was the announcement of the board. But the machinery of the War Industries Board in Washington has not been sufficient to deal with the difficulties of this growing problem. Urgent calls for new buildings were presented every day by prospective constructors throughout the country. In each case they presented what seemed to be excellent evidence for the immediate need of the buildings they had planned. The War Industries Board assumed a stern Missourian attitude, but it had no means of being sure when it was shown.

So Chairman Baruch has called upon the State Coun-

cils of National Defense to assist in this important work. Hereafter no permission will be given for any new non-war construction until these councils, through their local organizations, have investigated the project. If they reject it, the War Industries Board will not even listen to the application. But even if the State Council approves the project, final decision will still be reserved to the War Industries Board, for the latter will have a better view of the national interest and the general situation than the local organization can have.

Government Work Not Included

The new order will not include undertakings directly, or under contract with, the War Department, Navy Department, Emergency Fleet Corporation, the United States Railroad Administration or any railroad operated by it, the Bureau of Industrial Housing and Transportation, or the United States Housing Corporation. Nor will it include repairs or extensions costing less than \$2,500, construction connected with mining operations and road improvements approved by the United States Highways Council.

This extension of the work of the State Councils of National Defense is to be only the first step toward a broader use of these organizations in the Nation's conservation program. Chairman Baruch of the War Industries Board is now at work on plans for increasing their co-operation because they represent a machinery which is greatly needed in securing local assistance in the work of Government boards.

New Contracts Restricted

Housing and transportation conditions have become so congested in a long list of industrial centers manufacturing war supplies that the War Department has had to issue orders to restrict new contracts for these regions. The Bureau of Industrial Housing of the Labor Department has already had to undertake an increase of housing and transportation in these districts but even with this help living conditions have become so congested that it has interfered with production. For that reason, the General Staff has ordered that the placing of orders in these towns be reduced to a minimum. The Quartermaster's Corps has received particular instructions to avoid these points because of the relative flexibility of their contracts.

The cities and towns affected by this rule are the following:

Aberdeen, Md.; Alliance, Ohio; Alton, Ill.; Bangor, Maine; Bayonne, N. J.; Bethlehem, Pa.; Bridgeport, Conn.; Butler, Pa.; Camden, N. J.; Charleston, S. C.; Charleston, W. Va.; Chester, Pa.; Davenport, Ia.; Dayton, Ohio; Derby, Conn.; Easton, Pa.; Eddystone, Pa.; Elizabeth, N. J.; Erie, Pa.; Florence, Ala.; Hammond, Ind.; Indiana Harbor, Ind.; Jersey City, N. J.; Gary, Ind.; East Chicago, Ill.; Lowell, Mass.; Middletown, Ohio; Milton, Pa.; Moline, Ill.; Newark, N. J.; New Brunswick, N. J.; New Castle, Del.; New London, Conn.; New Orleans; Newport, R. I.; Newport News, Va.; Niagara Falls, N. Y.; Niles, Ohio; Norfolk, Va.; Pensacola, Fla.; Perth Amboy, N. J.; South Amboy, N. J.; Philadelphia; Phillipsburg, N. J.; Portsmouth, N. H.; Portsmouth, Va.; Puget Sound, Wash.; Quincy, Mass.; Rock Island, Ill.; Seattle, Wash.; Sharon, Pa.; Sheffield, Ala.; Mariners Harbor, Staten Island, N. Y.; Tacoma, Pa.; Troy, N. Y.; Utica, N. Y.; Warren, Ohio; Waterbury, Conn.; Watertown, Mass.; Watertown, N. Y.

The Scientific Materials Co., Pittsburgh, Pa., has published a pamphlet, "Standard Laboratory Tests of Coal-Coke By-Products," which is the result of an effort to place on the market such apparatus for the type product laboratory as will adequately meet the requirements of American chemists working in the field.

Tensile Strength and Hardness of Steel

Their Relation Shown by Means of Graphical Charts—One Being Known, the Other Can Be Easily Ascertained Without Recourse to Tests

BY H. M. BRAYTON*

IT IS very often desirable to be able to obtain an approximate idea of the tensile strength of a piece of steel when only the Brinell or sclerometer hardness number is known. It may happen that it is a comparatively simple matter to obtain the hardness number while the securing of the tensile strength would be impossible without destroying the finished article. The hardness may also be obtained very quickly while the tensile strength requires the turning up of very elaborate specimens, followed by careful testing. Many cases arise where the tensile strength is needed only approximately and it is in these cases where the relation between the hardness and strength plays the most important part.

The reverse of this might also be true in cases where a tensile machine is available or where such data had been obtained and a hardness machine could not be had. If the mathematical relation is known the hardness may readily be found.

The purpose of this article is to show how these standard formulæ, giving the relation between the tensile strength and hardness, may be built up into graphical charts whereby the solution becomes very simple and the man without knowledge of mathematics can solve them as well as the expert mathematician. These charts will apply equally well in solving for either variable; that is,

either the hardness or strength may be read off when the other is known.

Authorities differ somewhat in the equations given for this relation, but undoubtedly the most authentic data available are given in D. K. Bullen's excellent test on "Steel and Its Heat Treatment." These equations, which were taken from the works of R. R. Abbott, American Society for Testing Materials, Vol. XV, Part II, 1915, represent the results and conclusions from several hundred tests. Formulæ are given covering several of the regular alloy steels and these are all reproduced below for the reader's guidance.

The formulæ here concerned are as follows:

M = Tensile strength in pounds per square inch.

B = Brinell hardness number.

Ordinary carbon steels:

$$M = 0.73 B - 28$$

Nickel steels:

$$M = 0.71 B - 32$$

Chrome nickel steels (1.5 per cent Ni, 0.5 per cent Cr):

$$M = 0.68 B - 22$$

Chrome nickel steels (3.5 per cent Ni, 1.0 per cent Cr):

$$M = 0.71 B - 33$$

Vanadium steels:

$$M = 0.71 B - 29$$

It is evident that these formulæ are all of the same general form and vary only by constants. The general form is as follows:

$$M = C_1 B - C_2$$

where C_1 and C_2 are constants. We may then consider these five equations in the light of one four-variable equation and chart it as such. If this is done then the resulting chart should

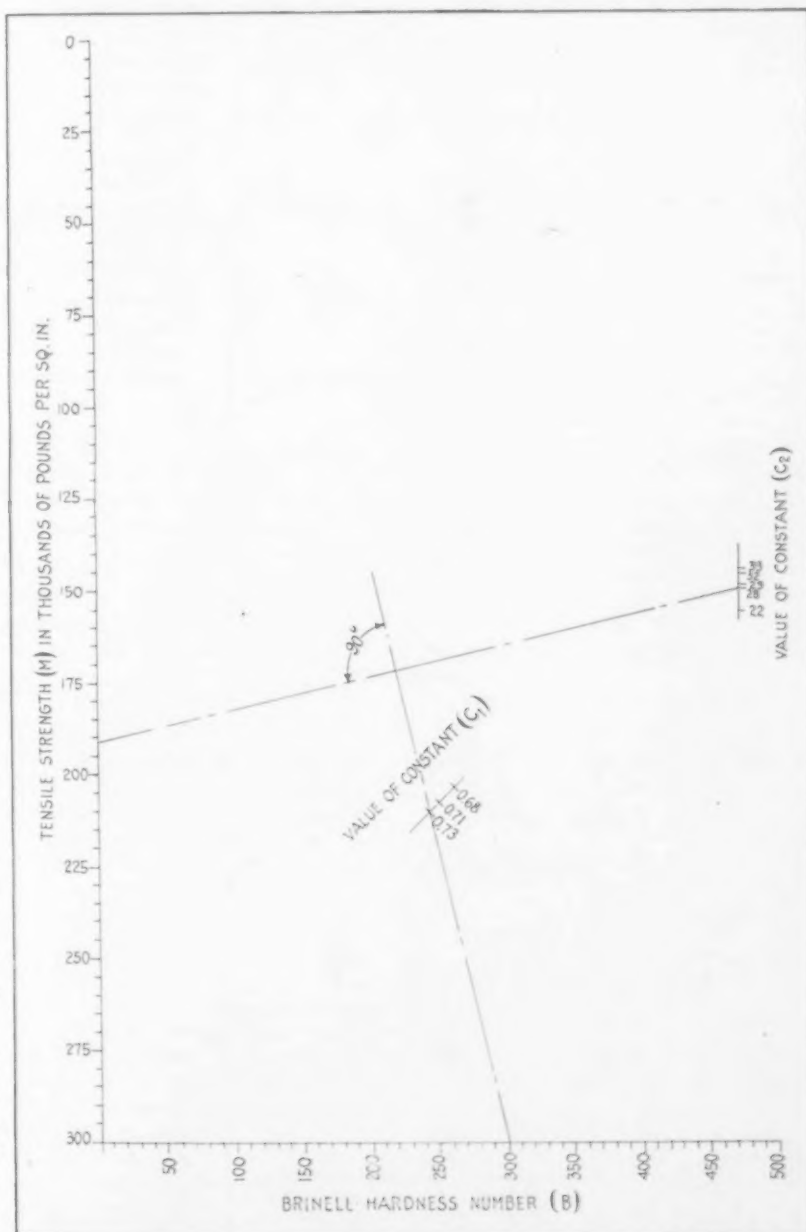


Fig. 1—Chart Built Up for Reading the Tensile Strength or Brinell Hardness, One Being Known

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solve all five of the above equations, and the two constants C_1 and C_2 will be variables and treated as such.

Fig. 1 shows this chart built up for practical use. In order to use it, it is only necessary to rule on a piece of tracing cloth or transparent celluloid two perpendicular lines and lay them so that the three known variables are cut out on their respective scales. The point where the line crosses the fourth scale will be the value of the unknown variable.

In order to make this clear, let us assume that we desire to know the tensile strength when the Brinell hardness is known to be 300 and the values of C_1 and C_2 are respectively 0.73 and 28, which means that we are considering ordinary carbon steels. The line through the value of C_2 when continued cuts out the value of 191,000 lb. per sq. in. for the tensile strength. In an exactly similar way any one of the four variables may be solved, for although in this formula there are but two that are important.

By means of this chart the practical man can obtain at once the tensile strength of any of the plain or alloy steels mentioned when he knows the hardness number on the Brinell scale or vice versa.

Relation Between Tensile Strength and Scleroscope Hardness

It is not always practical to get the Brinell

hardness of a piece of steel, and in such cases the scleroscope test must be applied. Formulae expressing the relation between the strength and scleroscope hardness number have been developed by the same authors as those mentioned above and are given below.

M = Tensile strength in pounds per square inch.
 S = Scleroscope hardness number.

Ordinary carbon steels:

$$M = 4.4 S - 28$$

Nickel steels:

$$M = 3.5 S - 6$$

Chrome nickel steels (1.5 per cent Ni, 0.5 per cent Cr):

$$M = 3.7 S - 1$$

Chrome nickel steels (3.5 per cent Ni, 1.0 per cent Cr):

$$M = 3.7 S - 3$$

Vanadium steels:

$$M = 4.2 S - 21$$

These formulae are of the same general form as those above and may therefore be built up into a graphical chart which will solve all of them in one. Such a chart is shown in Fig. 2. This is read in exactly the same way as that given in Fig. 1. As an illustration, let us assume a value of $S = 45$, $C_1 = 4.2$, $C_2 = 21$, from which we note that the tensile strength (M) comes out 168,000 lb. per sq. in. This is the formula for vanadium steels.

Kent or Brinell Hardness and Tensile Strength

Kent gives in his handbook a relation between the Brinell hardness and the tensile strength which was determined from experiments made in Sweden on annealed steel. These relations are as follows:

$$M = C \times H$$

Where M = Tensile strength in kilograms per sq.m.m.

C = A constant.

H = Brinell hardness number.

The value of this constant is given as follows: Impression made transverse to rolling direction and H below 175, C equals 0.362. Same with H above 175, C equals 0.344. Impression made in direction of rolling and H below 175, C equals 0.355. Same with H above 175, C equals 0.324. When the value of the tensile strength has been transferred to read in pounds per square inch these constants become respectively 462, 490, 504 and 516. This is then a very simple formula of the product type, and Fig. 3 shows it built up into a simple chart which solves this formula by merely laying a straight edge across the three scales. The dash-dot line shows that when the constant equals 516 and the hardness number 100 the strength will be 51,600 lb. per sq. in.

These two relations between the hardness and the strength do not exactly agree, but the

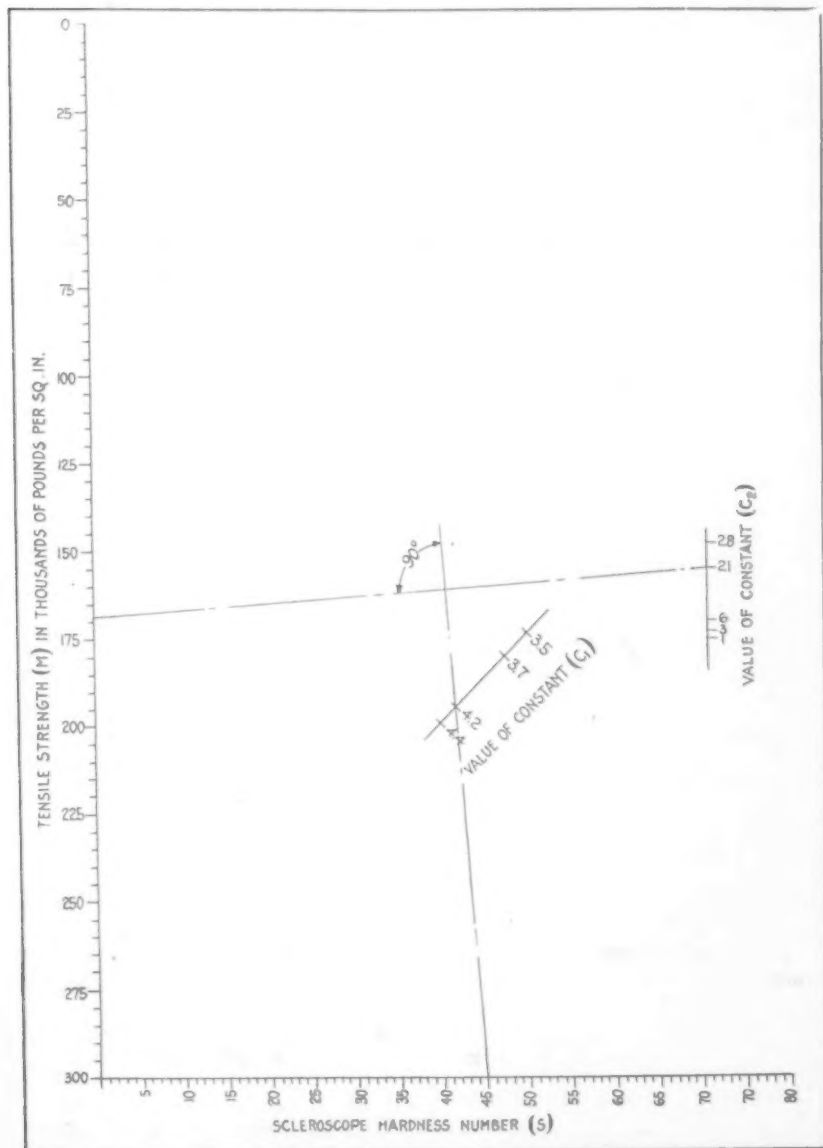


Fig. 2.—Chart Built Up for Reading the Tensile Strength or Scleroscope Hardness, One Being Known

der is left his choice in the mat-
and the charts shown in Fig.
and Fig. 3 will solve either formula
quickly and without calculation.
is believed that these charts will
be of value to steel men and to all
who may have occasion to solve
formulæ.

Youngstown Industries Make Good Showing

In spite of the hot weather, shortage
labor, also other unfavorable condi-
the output of steel in the Youngs-
Ohio, district in August was larger
was expected. Two of the leading
concerns reported their output of
steel in August was above 90 per
of capacity, and another states that
pig iron output was over 100,000 tons
month. It is expected that pig iron
output by Youngstown furnaces will
show an increase from this time on, and
this is the case, a still larger output
steel will result.

The Youngstown Sheet & Tube Co.
started the sixth battery of 51 Kop-
by-product coke ovens, making a
total of 306 ovens of this type now being
operated by it. The output of coke from
the 306 ovens will give a full supply
for the four blast furnaces of the Youngs-
Sheet & Tube Co., at Youngstown,
also for its two Hubbard furnaces at
Girard, Ohio. If the company gets a
supply of coal to operate all its coke
ovens in full, its output of pig iron will
show a large increase.

The Republic Iron & Steel Co. ex-
pects to start its No. 3 blast furnace at
Alton this week. It has been out of
operation for several months for relining and
repairs. The Girard furnace of A. M.
Carnegie & Co. at Girard, Ohio, which has
been rebuilt in the last 60 days, is about completed, and
probably go in blast this week. It will make from
400 to 500 tons of forge pig iron per day, all of which
will be used in its 88 puddling furnaces at Girard.
The Carnegie Steel Co. has started an 8-in. hoop
mill at the new McDonald plant, making the third mill
in operation. Another hoop mill is nearly com-
pleted, and will likely be started in October.

Remote Control Induction Motor Starters

A device for starting small induction motors from
remote points by throwing them directly across the
line has been brought out by the General Electric Co.,
Schenectady, N. Y. It is arranged for push-button
operation and when the starting button is pressed the
starting circuit is completed and the coil of the mag-
netically operated switch is energized, which closes the
circuit and throws the motor directly on the line. If
the circuit is interrupted or the voltage falls to a
certain degree, the contacts open by gravity, thus stop-
ping the motor, which cannot start again until the
starting button is pressed. Overload protection is also
provided, and the cover of the inclosing case can be
locked in a closed position if desired. The starter is
designed for use with motors up to and including 5 hp.
110 volts, and 7½ hp. units wound for 220, 440, and
550 volts.

The first barge to the Gulf on the Mississippi River
will depart for New Orleans from Alton, Ill., Sept. 28,
and a barge will leave every seven days thereafter.
This is supplementary to the Government barge line
which will also start from St. Louis during the month
and in the direction of the officials already appointed.

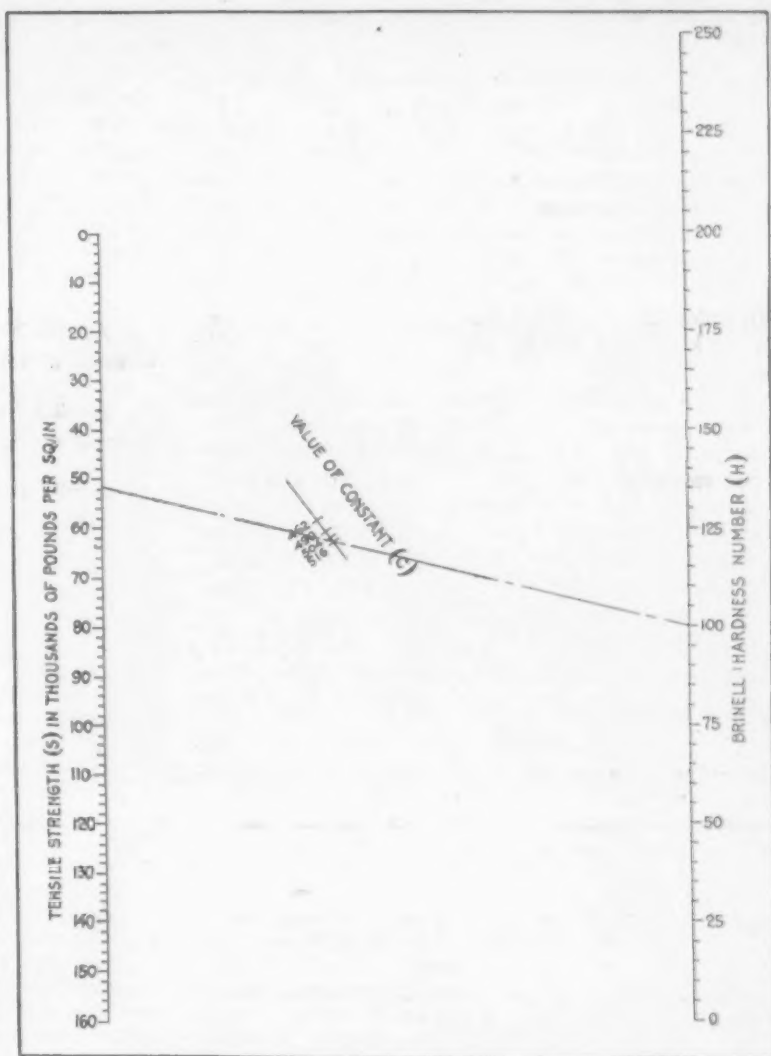


Fig. 3.—Chart for Reading Tensile Strength or Brinell Hardness Built Up from Formula of Kent

Lake Iron-Ore Shipments in August

Shipments of iron ore from the Lake Superior re-
gion in August were large, but a record was not estab-
lished, as in June and July of this year. The August
total was 9,725,331 gross tons, as compared with 10,-
146,786 tons in August, 1917, a decrease of 421,455
tons, or 4.15 per cent. The totals by ports, with season
shipments, and a comparison with 1917, are given
below:

	August, 1918	August, 1917	To Sept. 1, 1918	To Sept. 1, 1917
Escanaba	1,168,604	951,620	4,011,481	4,089,191
Marquette	592,073	629,426	2,276,092	1,899,062
Ashland	1,209,394	1,278,118	4,582,509	4,425,912
Superior	2,146,689	2,444,632	9,197,933	8,202,216
Duluth	3,243,806	3,326,254	13,156,393	11,999,021
Two Harbors	1,364,765	1,516,736	6,109,356	5,908,152
Total	9,725,331	10,146,786	39,334,264	36,523,554
1918 decrease ..	421,455			
1918 increase ..			2,810,710	

The increase in season shipments to Sept. 1, 1918,
has been 2,810,710 tons, or 7.69 per cent over the same
period in 1917. The Duluth percentage of this total is
33.45 per cent, as compared with 32.85 per cent a year
ago. That for the Great Northern also shows an in-
crease this year, that work's percentage in the total
being 19.21 per cent, as against 18.58 per cent last year.
Two Harbors fell off this year slightly.

The National Implement and Vehicle Association
will hold its twenty-fifth annual convention in Chicago,
Oct. 16, 17, 18, with headquarters at the Congress
Hotel. It will be distinctly a war convention. The
association has given its active co-operation to the
Government in the many phases of the war program
affecting the food supply and the husbanding of ma-
terial resources.

A Cause of Failure in Boiler Plates*

Effect of Grain Growth—Alteration of Crystalline Structure by Mechanical Deformation—Some Remedies

— BY WALTER ROSENHAIN AND D. HANSON —

THE occasional cases of failures in boiler plates met with in practice have formed the subject of several papers and discussions before the Iron and Steel Institute in recent years. A number of such cases have been investigated by the authors, and an account of one which offers features of particular importance which do not appear to have been previously noticed is here presented. These are of special importance, because it may be found that they afford a clue to the cause of failure in other cases, particularly in boiler plates of the largest dimensions.

The failure occurred in the last stage of the manufacture of the plate. The size and dimensions of the plate are illustrated in Fig. 1. The plate has a thickness of 1½ in. and measures 4 ft. 4 in. in width by 11 ft. in length. It was manufactured under a stringent specification, but cracked during the straightening of the edges after the bending operations had been completed. Inquiry showed that the bending operations had been carried out in stages in the cold, the plate being subjected to intermediate annealings between the various stages. The position of the crack which formed in the plate is indicated in the diagram.

The material of the plate was first submitted to chemical analysis, mechanical tests, and general microscopic examination. The results obtained were as follows:

Chemical Analysis			
Per Cent		Per Cent	
Carbon	0.16	Manganese	0.623
Silicon	0.079	Nickel	0.10
Sulphur	0.030	Chromium	nil
Phosphorus	0.048		

There is nothing abnormal in this composition, which represents a mild steel of high quality.

Tensile tests were taken from the outside and inside of the plate as received, with the results in Table 1, columns 1 and 2:

Here again there is nothing abnormal, except perhaps a slight indication of an unusual condition of the steel in the comparatively large difference between elastic

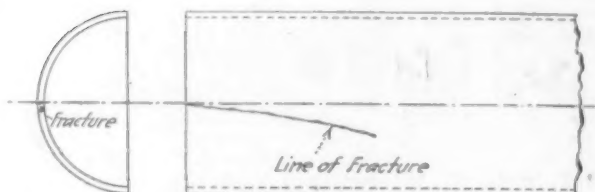


Fig. 1.—Where the Fracture Occurred in the Steel Boiler Plate, which Was 1½ In. Thick, 4 Ft. 4 In. Wide, and 11 Ft. Long

changing the structural condition of the steel, a portion of the plate was annealed at 550 deg. C. for 30 min. The results of tensile tests of a plate in this condition are given in the third column of Table 1. It will be seen that the difference between elastic limit and yield stress is still comparatively large.

In order, further, to test this point, and also to ascertain how far the tensile tests obtained on the material as received and after annealing at 550 deg. correspond to the best properties which the material is capable of attaining, a sample of the plate was

Table 1.—Physical Tests of the Failed Plate

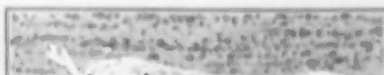
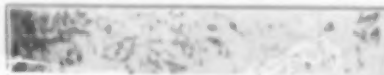
Particulars	Plate as Received		Plate Annealed, 550° C.	Plate Normalized, 900° C.
	Outside	Inside	Outside	Outside
Diameter, in.	1 0.375	2 0.375	3 0.375	4 0.375
Cross sectional area, sq. in.	0.1105	0.1105	0.1105	0.1105
Elastic limit, tons per sq. in.	14.2	11.3	15.4	18.3
Yield stress, tons per sq. in.	18.3	16.1	18.7	18.15
Ultimate stress, tons per sq. in.	26.86	27.24	27.61	27.04
Modulus, lb. per sq. in.	29.8 × 10 ⁶	29.8 × 10 ⁶	30.4 × 10 ⁶	30.2 × 10 ⁶
Extension per cent on 13 in.*	31.6	33.1	34.5	42.2
Reduction of area per cent	59.6	60.7	59.1	62.5

*A gage length of 1.3 in. is chosen to give a ratio of length to diameter equal to 3.5.

normalized by heating to 900 deg. C. followed by cooling in air. The results of tensile tests made on the sample thus treated are given in column 4 of Table 1. Here it will be seen that the elastic limit has come very much closer to the yield stress, while the yield stress itself has been raised. The ultimate stress has only been slightly affected but, on the other hand, the elongation has been markedly improved.

Since the tensile tests showed little or no departure

from the normal condition in the material of this plate, it became desirable to apply other tests



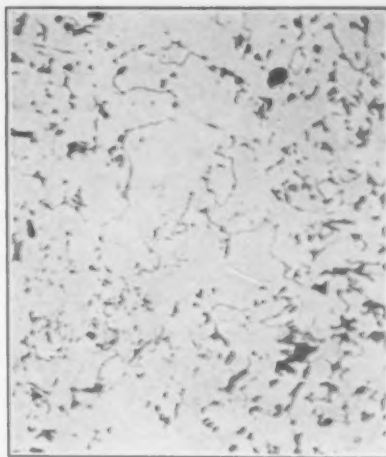
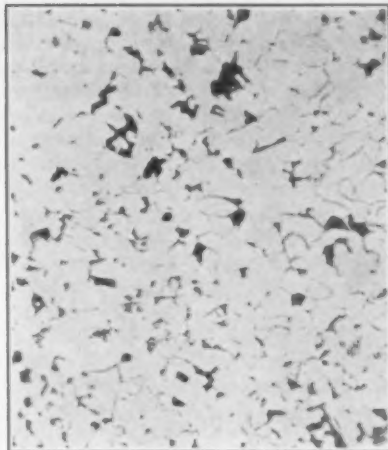
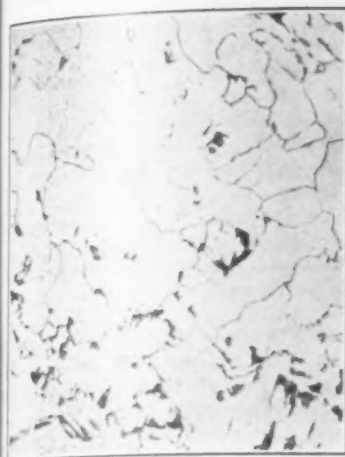


Fig. 4—(Left) The Large Ferrite Crystals in the Carbonless Bands of the Structure After Further Etching; Magnification is 150 Diameters. Fig. 5 (Center) is the corresponding grain of the same material after normalizing; magnification, 150 X. Fig. 6 (Right) is the structure of one of carbonless areas of the specimen which has been hammered in the cold and then annealed at 650 deg. C.; magnification, 150 X.

impact test, yet experience has repeatedly shown that materials which give a low figure under an impact test are liable to fail under apparently static conditions.

The form of impact test employed is that known as the international notched bar impact test, made with a modification of the Charpy impact testing machine, and on specimens measuring 10 mm. by 10 mm. in section by 53.3 mm. in length, having in the middle a rounded notch with a radius of two-thirds of a millimeter. On the material as received this test gave a mean figure of 0.75 kgm. per sq. cm., the actual values obtained being: 0.84, 0.88, 0.66, 1.08, 0.86, 1.20. These figures are of course very abnormally low, a reasonable value for a boiler plate of this kind being from 8 to 11 kgm. per sq. cm. It was thought that possibly this low value might be due to cold work which the plate had received, leaving it in a work-hardened and, possibly, internally strained condition. The impact tests were therefore repeated on specimens of the plate which had been annealed for thirty minutes at 550 deg. C., in the same way as had been done with the tensile test pieces. The mean result of six impact tests made on the steel in this condition gives a value of 2.90 kgm. per sq. cm., the actual figures obtained being as follows: 2.10, 3.86, 2.64, 3.36, 3.52, 1.92.

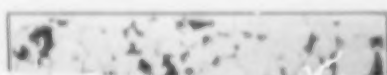
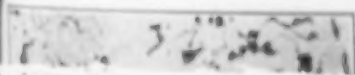
It will be seen that this very low temperature annealing, by removing cold work and internal stress, has improved the impact behavior of the material quite appreciably, but that, even when thus treated, it is still very far below the normal value for steel of this grade. This is indicated by the impact figures given on samples of the plate after normalizing at 900 deg. C., when values of 10.78 and 11.72—mean, 11.25 kgm. per sq. cm. were obtained.

It is evident from these figures that the steel of the

fractured plate is in an abnormally bad condition, presumably as the result of some treatment—thermal or mechanical, or both—which it has received during manufacture, and it became necessary to discover, if possible, the cause of this abnormality.

The general microscopic examination of the steel showed at first sight nothing abnormal. The structure in general transverse and longitudinal section is shown under a magnification of 50 diameters in photomicrographs Figs. 2 and 3. It will be seen that the scale of the structure, so far as ferrite-pearlite distribution is concerned, appears to be satisfactory, but there is a considerable amount of banding present, although this amount is not in itself abnormal for a plate of such large size.

More careful examination of the structure, however, particularly after it had been etched in such a way as to develop the ferrite boundaries, revealed a striking peculiarity. This takes the form of relatively very large ferrite crystals in the carbonless bands of the structure. These are illustrated, under a magnification of 150 diameters, in Fig. 4. The corresponding grain size of the same material, after normalizing, is shown in Fig. 5 under the same magnification. It should be noted, however, that the normalized structure shown in Fig. 5 has been obtained not by treating a small laboratory sample but from a comparatively large piece of the plate about a foot square which had been subjected to the heat treatment described. The most careful study of the steel in both conditions revealed no other difference between the "as received" and normalized conditions. The inference is thus indicated that the abnormal impact behavior of the steel as received may be due to the development of coarse crystals in the carbonless bands which occur in this material, and



INSPECTING REFRACTORY BRICK*

Standard Specifications a Necessity—Results of Some Tests

BY C. E. NESBITT AND M. L. BELL

In nearly all industries, both raw material and finished products are bought and sold on specifications. These vary from the most exacting to those in which nothing of importance is specified. The specifications for refractory bricks unfortunately come in the second class. This condition is unsatisfactory, and the time is rapidly approaching when specifications covering the important industrial qualities desired will have to be written.

A few simple specifications for refractories have been written. Some are in use, but they are of little practical value. Many tests advocated at the present time for refractories are not suited for use in specifications, as they do not show important qualities or are entirely too slow to be commercially applied. A manufacturer or consumer may handle daily from 50,000 to 150,000 bricks. If only one brick in every thousand is taken as a representative sample, it means that from 50 to 150 bricks must be sampled, tested and reported upon each day; hence, tests to be of commercial importance must be rapid, and to be of value must give definite values indicating the fitness or unfitness of the brick for the purpose intended.

The inspection of brick will probably have to proceed along lines similar to that of steel, which has been worked out most carefully and thoroughly. Steel is tested by the manufacturer throughout all its primary stages so that he knows the finished product will be of good quality. The brick manufacturer will have to test the brick during manufacture to insure uniform grinding, molding, drying and burning, resulting in consequent uniformity. A great deal of research work will have to be done by the brick manufacturer to determine what methods he should pursue.

Specifications for brick should cover only those properties of the brick that are essential for some particular purpose. In testing bricks for the iron and steel industry, most important qualities can be satisfactorily determined by a few simple tests. In the case of silica brick, which are not ordinarily subjected to the action of slag, a spalling and a hot crushing test are considered sufficient; while clay brick should be subjected to load, spalling and slagging tests. These tests cover the particular qualities the brick must possess to give good service.

In addition to such tests it is, of course, very important that the bricks shall be subject to a careful visual inspection to guard against the acceptance of cracked or warped brick, poorly molded, off-size, or badly burned brick. One does not have to go far in the testing of bricks to note the wide variations in the results, which reflect the variation in the bricks themselves. This is illustrated by the wide differences in the results of various tests given in the following tables.

Spalling of Brick

Spalling or resistance to sudden thermal change is a most important quality in bricks, especially silica bricks. It is a very common cause of failure. In Table 1 are shown the results of spalling tests on five suc-

Table 1—Loss by Spalling of One Brand of Silica Brick

All Values are Expressed as Percentage					
Shipment No.					
1	2	3	4	5	
11.72	13.39	12.65	11.24	14.96	
13.95	15.53	13.44	12.45	21.01	
15.08	16.22	17.60	13.94	21.96	
19.47	20.38	19.01	19.53	23.93	
22.39	21.84	28.29	21.43	28.11	
24.12	23.48	23.32	22.51	29.47	
25.95	24.31	32.95	22.64	29.76	
32.45	24.80	34.03	24.81	30.88	
39.84	37.25	35.95	27.39	31.73	
40.80	42.27	41.31	30.00	38.34	
Average	24.58	23.95	25.86	20.59	27.02

*From a paper presented at the twenty-first annual meeting of the American Society for Testing Materials at Atlantic City, N. J., June 25 to 28, 1918.

cessive shipments of one brand of silica brick. These tests were made in accordance with method given for "spalling" in the appendix of our paper presented to the society last year, entitled "Suggested Improvements in the Manufacture of Silica Brick."*

The spalling loss on bricks from the same shipment varied from 11.72 to 40.80 per cent in one case and 13.39 to 42.27 per cent in another shipment, although the average for all the shipments was about 25 per cent. Such variations are due to lack of uniformity in grinding, molding and general workmanship, all of which can be largely eliminated with proper care.

Crushing Tests

Similar lack of uniformity has likewise been shown by the crushing test. A series of tests were made on a number of commercial bricks, the object being to determine the variation in actual crushing strength of bricks from the same shipment and the relative crushing strength of different brands of brick when tested at different temperatures.

Six different brands were represented, of which two brands were clay bricks and four silica bricks, all of supposedly good quality. In sampling, all bricks of each individual make were chosen from a single order and represent several cars. Only bricks judged to be good by visual inspection were taken for the test. The bricks were prepared and tested as described in the appendix of our paper before the society last year, referred to already.

The total crushing strength of clay brick at 1000 deg. C. is apparently higher than the strength at 30 deg. C., but this is misleading. At elevated temperatures clay bricks start to splinter off before being completely crushed. The results obtained at first deformation at 1000 deg. C. are lower than those at 30 deg. C., which is in accord with the results obtained on silica bricks; namely, the higher the temperature, the weaker the brick. We do not favor the hot crushing test for clay brick, the load or ball impression test being more suitable.

Slag Penetration

Lack of uniformity of product is not shown by the spalling and crushing tests alone, but also by the variations in slag penetration. This is largely governed by lack of uniform structure, due to lack of uniform grinding, molding and burning.

Conclusion

The results of a few tests point out the necessity for the inspection of refractory brick as the only means of obtaining brick of uniform quality. At present the consumer is forced to accept brick without direct information as to their quality. Many instances can be cited where brick of poor quality have been accepted without knowledge of their inferiority, resulting in the premature failure of the furnace or other structure in which they were used and causing an unnecessary loss of money, time and production.

Before the bricks are shipped by the manufacturer a great deal can be accomplished by careful visual inspection, by means of which all bricks irregular in shape, off size, fire cracked, improperly molded, and of poor general appearance would be eliminated. If proper care is taken in the brick plant this rejection need not be a very large percentage of the output. A storage shed should be provided so that bricks may be taken from the kiln and stored for a period of time sufficient for this inspection and the necessary tests.

The present methods of making refractory brick do not produce a uniform product. The consumer is powerless to change these methods. To secure greater uniformity, he must adopt specifications for brick with the end in view not to reject material which is good, but to guard against the acceptance of that which is bad.

*Proceedings, Am. Soc. Test. Mats., Vol. XVII, Part II, p. 468 (1917).

A 9-In. Merchant Mill with Motor Drive

After 35 years service the steam engine driving a 9-in. merchant rolling mill in the plant of the Cleveland Hardware Co., Cleveland, was recently replaced by a 450-hp. electric motor. One of the interesting features connected with the installation is the fact that the power required for the operation of the mill is purchased from the Cleveland Illuminating Co. at what is said to be a more reasonable price than it could be supplied by a privately owned plant. The production of the mill, it is stated, has increased considerably since the change in the driving power. The output of the mill includes bars of various sizes and shapes for use in the manufacture of drop forgings for automobile and similar classes of work. In an average 3-hr. shift, about 35 tons of $\frac{7}{8}$ -in. rounds can be rolled from billets 4 in. square. On the other shapes, the output is as follows: $\frac{7}{8}$ -in. squares, 45 tons; $1\frac{1}{4} \times 1\frac{1}{4}$ -in. flats, 40 tons; $\frac{5}{16} \times 4$ -in. flats, 35 tons; $\frac{3}{8}$ -in. rounds, 20 tons; and $\frac{5}{16} \times \frac{1}{2}$ -in. ovals, 30 tons. The speed variation required is obtained by a double winding designed to give the motor 8 or 10 poles.

The motor employed, which is of the Westinghouse 3200-volt wound-rotor type, is rated at 450 hp. at a speed of 900 r.p.m. and 360 hp. at 720 r.p.m. The power supplied by the local utility company is three-phase 60-cycle current at 11,000 volts, and is stepped down by a three-phase, oil-insulated, self-cooled transformer. The motor shaft is connected to the pinion of a herringbone type reduction gear by a Nuttall flexible spring coupling designed especially for steel mill service. The reduction gear, which operates in oil in a completely inclosed case, reduces the motor speeds to 240 and 192 r.p.m. respectively. The slow-speed side of the gear is connected through a similar coupling to an open-hearth steel flywheel which is 12 ft. in diameter and weighs 10 tons. The wheel is made in one piece, with rectangular arms, and is mounted on two heavy pillow blocks, the other end of the flywheel being connected to the rolling mill shaft.

The equipment is controlled by a two-panel switchboard mounted on an angle-iron frame. The switches for changing the winding on the motor from 8 to 10 poles are located one in the primary and the other in the secondary circuit. These switches are immersed in oil and are marked to enable mill operator to manipulate them easily. Mechanical interlocking is provided for primary circuit breakers which can be closed one at a time if desired. When it is necessary to stop the mills quickly as in the case of an emergency, the running circuit breaker is tripped, which causes all of the secondary breakers to open. The reverse circuit breaker is then closed, thus bringing the motor to rest quickly.

The United States Shipping Board, Emergency Fleet Corporation, has undertaken the establishment of night schools for shipyard workers. The plan is being formulated by the education and training section of the industrial relations group of this organization. To carry out the work it is proposed to enlist the co-operation of the public school systems at the centers where the shipyards are located. Another feature of the educational work undertaken by this section is the establishment of the blue-print reading school at the yard of the Maryland Shipbuilding Co. at Sollers, Md.

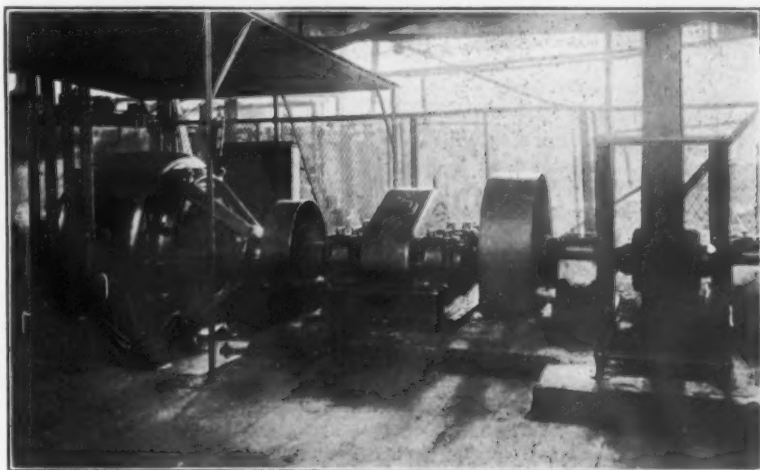
The Heine Safety Boiler Co., St. Louis, has elected these officers for the current year: President and treasurer, C. R. D. Meier of St. Louis; vice-president, E. R. Fish, Phoenixville, Pa.; secretary and assistant treasurer, James T. Brennan, St. Louis; directors, C. R. D. Meier, Daniel N. Kirby, J. Herndon Smith, all of St. Louis; Paul H. Brangs, New York, and E. R. Fish, Phoenixville, Pa.

Ordnance Department Appointments

Maj.-Gen. C. C. Williams, chief of ordnance, authorizes the following announcements:

Louis J. Horowitz, formerly president Thompson-Starrett Construction Co., New York, has been appointed as special assistant to the chief of ordnance in charge of tanks. In this capacity he will have authority to decide all questions pertaining to the engineering, manufacturing and inspection of tanks.

Brig.-Gen. John T. Thompson, U. S. A., retired, in addition to his duties as director of arsenals and ad-



A 450-Hp. Motor in Which the Speed is Adjusted by a Double Winding That Varies the Number of Poles Has Replaced a Steam Engine as the Driving Power for a 9-In. Merchant Rolling Mill

visory engineer, has been made director of ordnance training. In this position he will determine the type of training to be given the commissioned, enlisted and civilian personnel of the Ordnance Department and will make provisions for this training. General Thompson will also give final approval to all subjects to be taught, character and scope of examinations, and will establish a system of inspection of all the schools operated by the Ordnance Department.

Capt. S. E. Blunt, U. S. A., has been appointed employment supervisor and will work in conjunction with the commanding officers of the several arsenals and other ordnance establishments to secure the necessary personnel for their efficient operation.

The State of Montana, heretofore under the jurisdiction of the St. Louis ordnance district, has been transferred to the Chicago ordnance district, which has its headquarters at 155 Superior Street, with E. A. Russell, district ordnance chief.

Chicago Meeting of Association of Engineers

The Chicago chapter of the American Association of Engineers tendered a welcoming dinner at the City Club on the evening of Sept. 4 to its incoming secretary, C. E. Drayer. Isham Randolph acted as toastmaster, and W. H. Finley, president of the association, welcomed the new secretary, who spoke in part as follows:

"There is no business but war. Yet we must find time to formulate and attack the large problems that are remotely connected with the war. We may say there are at least six such problems, namely, the status of the engineer, ethics, organization, education, civic responsibility, and the relation between capital and labor.

"It is an absurd situation when the mechanic who executes the plans gets more pay than the man who designs. Our engineering organization must be founded on service to the individual member and through him and through the association to society. In the educational system of our technical schools there is lacking the commercial spirit. That the engineer is not on various committees of chambers of commerce and other civic organizations to make his influence felt everywhere is due principally to the attitude of mind which he brings from school."

A Cause of Failure in Boiler Plates*

Effect of Grain Growth—Alteration of Crystalline Structure by Mechanical Deformation—Some Remedies

— BY WALTER ROSENHAIN AND D. HANSON —

THE occasional cases of failures in boiler plates met with in practice have formed the subject of several papers and discussions before the Iron and Steel Institute in recent years. A number of such cases have been investigated by the authors, and an account of one which offers features of particular importance which do not appear to have been previously noticed is here presented. These are of special importance, because it may be found that they afford a clue to the cause of failure in other cases, particularly in boiler plates of the largest dimensions.

The failure occurred in the last stage of the manufacture of the plate. The size and dimensions of the plate are illustrated in Fig. 1. The plate has a thickness of 1½ in. and measures 4 ft. 4 in. in width by 11 ft. in length. It was manufactured under a stringent specification, but cracked during the straightening of the edges after the bending operations had been completed. Inquiry showed that the bending operations had been carried out in stages in the cold, the plate being subjected to intermediate annealings between the various stages. The position of the crack which formed in the plate is indicated in the diagram.

The material of the plate was first submitted to chemical analysis, mechanical tests, and general microscopic examination. The results obtained were as follows:

Chemical Analysis			
Per Cent		Per Cent	
Carbon	0.16	Manganese	0.623
Silicon	0.079	Nickel	0.10
Sulphur	0.030	Chromium	nil
Phosphorus	0.048		

There is nothing abnormal in this composition, which represents a mild steel of high quality.

Tensile tests were taken from the outside and inside of the plate as received, with the results in Table 1, columns 1 and 2:

Here again there is nothing abnormal, except perhaps a slight indication of an unusual condition of the steel in the comparatively large difference between elastic limit and yield stress. It was thought that possibly this peculiarity might arise from the existence of internal stresses in the material, and in order to remove these as far as possible without

*From a paper presented at the meeting of the Iron and Steel Institute in London, May 2, 1918. The authors are connected with the National Physical Laboratory (British).

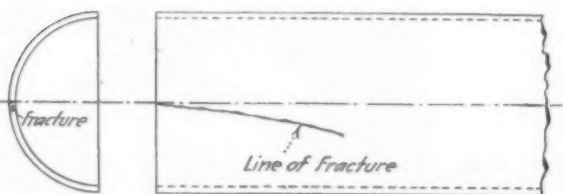


Fig. 1.—Where the Fracture Occurred in the Steel Boiler Plate, which Was 1½ In. Thick, 4 Ft. 4 In. Wide, and 11 Ft. Long

changing the structural condition of the steel, a portion of the plate was annealed at 550 deg. C. for 30 min. The results of tensile tests of a plate in this condition are given in the third column of Table 1. It will be seen that the difference between elastic limit and yield stress is still comparatively large.

In order, further, to test this point, and also to ascertain how far the tensile tests obtained on the material as received and after annealing at 550 deg. C. correspond to the best properties which the material is capable of attaining, a sample of the plate was nor-

Table 1.—Physical Tests of the Failed Plate

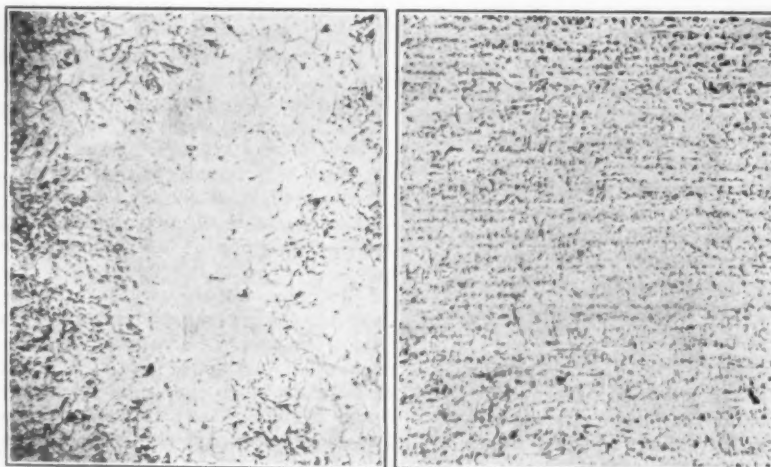
Particulars	Plate as Received		Plate Annealed, 550° C.	Plate Normalized, 900° C.
	Outside	Inside	Outside	Outside
Diameter, in.	1 0.375	2 0.375	3 0.375	4 0.375
Cross sectional area, sq. in.	0.1105	0.1105	0.1105	0.1105
Elastic limit, tons per sq. in.	14.2	11.3	15.4	18.3
Yield stress, tons per sq. in.	18.3	16.1	18.7	19.15
Ultimate stress, tons per sq. in.	26.88	27.24	27.61	27.94
Modules, lb. per sq. in.	29.8 × 10 ⁶	29.8 × 10 ⁶	30.4 × 10 ⁶	30.2 × 10 ⁶
Extension per cent on 13 in.*	31.6	33.1	34.5	42.2
Reduction of area per cent	59.6	60.7	59.1	62.5

*A gage length of 1.3 in. is chosen to give a ratio of gage length to diameter equal to 3.5.

malized by heating to 900 deg. C. followed by cooling in air. The results of tensile tests made on the sample thus treated are given in column 4 of Table 1. Here it will be seen that the elastic limit has come very much closer to the yield stress, while the yield stress itself has been raised. The ultimate stress has only been slightly affected but, on the other hand, the elongation has been markedly improved.

Since the tensile tests showed little or no departure

from the normal in the material of this plate, it became desirable to apply other tests in order to ascertain whether the properties of the steel were really as satisfactory as the tensile tests would indicate. For this purpose an impact test has been used, for although it is recognized that the conditions under which failure occurs in boiler plate possess no apparent resemblance to those of an im-



Figs. 2 and 3.—Structure in Transverse and Longitudinal Section of the Original Metal, Magnification, 50 Diameters. A considerable amount of banding is present

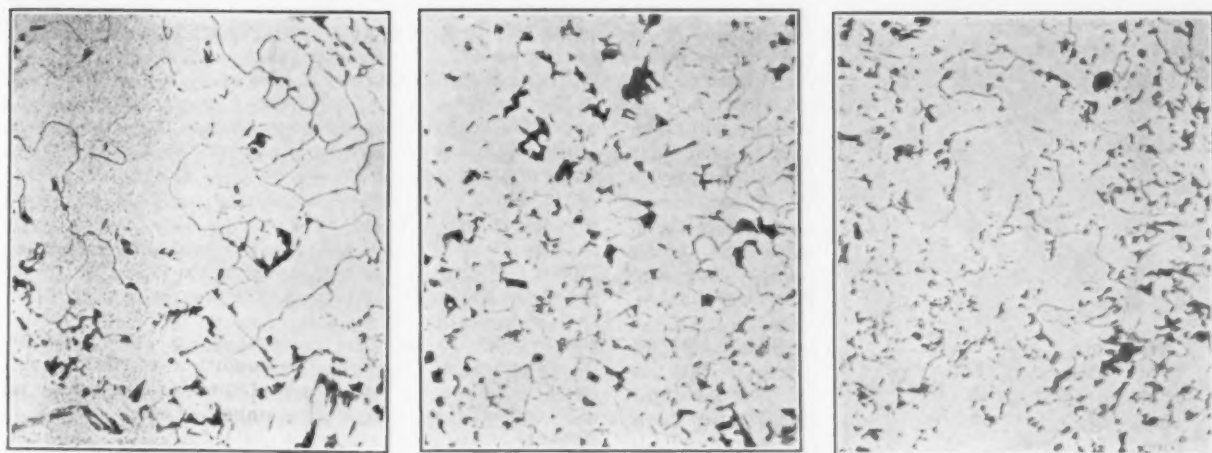


Fig. 4.—(Left) The Large Ferrite Crystals in the Carbonless Bands of the Structure After Further Etching; Magnification is 150 Diameters. Fig. 5 (Center) is the corresponding grain of the same material after normalizing; magnification, 150×. Fig. 6 (Right) is the structure of one of carbonless areas of the specimen which has been hammered in the cold and then annealed at 650 deg. C.; magnification, 150×.

fact test, yet experience has repeatedly shown that materials which give a low figure under an impact test are liable to fail under apparently static conditions.

The form of impact test employed is that known as the international notched bar impact test, made with a modification of the Charpy impact testing machine, and on specimens measuring 10 mm. by 10 mm. in section by 53.3 mm. in length, having in the middle a rounded notch with a radius of two-thirds of a millimeter. On the material as received this test gave a mean figure of 0.75 kgm. per sq. cm., the actual values obtained being: 0.84, 0.88, 0.66, 1.08, 0.86, 1.20. These figures are of course very abnormally low, a reasonable value for a boiler plate of this kind being from 8 to 11 kgm. per sq. cm. It was thought that possibly this low value might be due to cold work which the plate had received, leaving it in a work-hardened and, possibly, internally strained condition. The impact tests were therefore repeated on specimens of the plate which had been annealed for thirty minutes at 550 deg. C., in the same way as had been done with the tensile test pieces. The mean result of six impact tests made on the steel in this condition gives a value of 2.90 kgm. per sq. cm., the actual figures obtained being as follows: 2.10, 3.86, 2.64, 3.36, 3.52, 1.92.

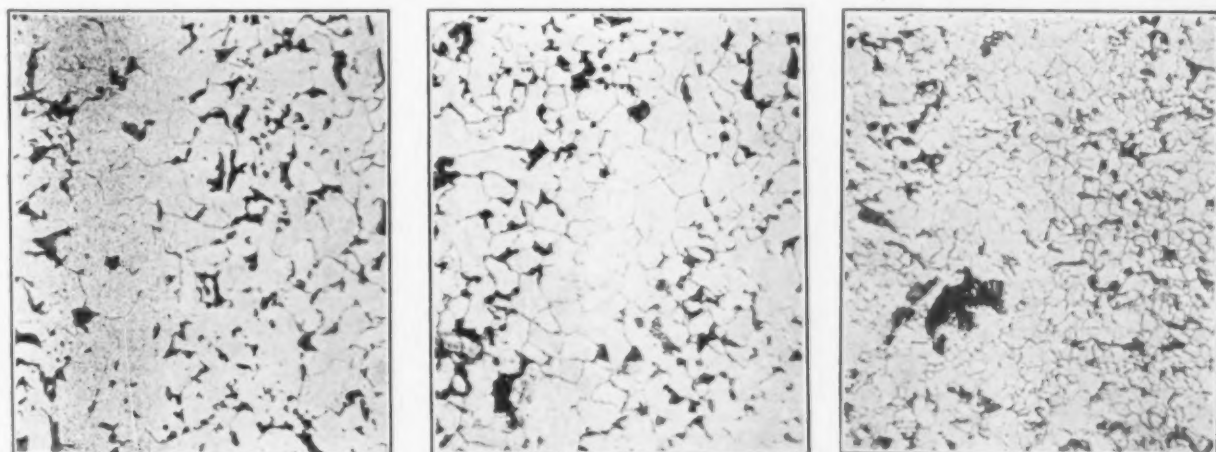
It will be seen that this very low temperature annealing, by removing cold work and internal stress, has improved the impact behavior of the material quite appreciably, but that, even when thus treated, it is still very far below the normal value for steel of this grade. This is indicated by the impact figures given on samples of the plate after normalizing at 900 deg. C., when values of 10.78 and 11.72—mean, 11.25 kgm. per sq. cm. were obtained.

It is evident from these figures that the steel of the

fractured plate is in an abnormally bad condition, presumably as the result of some treatment—thermal or mechanical, or both—which it has received during manufacture, and it became necessary to discover, if possible, the cause of this abnormality.

The general microscopic examination of the steel showed at first sight nothing abnormal. The structure in general transverse and longitudinal section is shown under a magnification of 50 diameters in photomicrographs Figs. 2 and 3. It will be seen that the scale of the structure, so far as ferrite-pearlite distribution is concerned, appears to be satisfactory, but there is a considerable amount of banding present, although this amount is not in itself abnormal for a plate of such large size.

More careful examination of the structure, however, particularly after it had been etched in such a way as to develop the ferrite boundaries, revealed a striking peculiarity. This takes the form of relatively very large ferrite crystals in the carbonless bands of the structure. These are illustrated, under a magnification of 150 diameters, in Fig. 4. The corresponding grain size of the same material, after normalizing, is shown in Fig. 5 under the same magnification. It should be noted, however, that the normalized structure shown in Fig. 5 has been obtained not by treating a small laboratory sample but from a comparatively large piece of the plate about a foot square which had been subjected to the heat treatment described. The most careful study of the steel in both conditions revealed no other difference between the "as received" and normalized conditions. The inference is thus indicated that the abnormal impact behavior of the steel as received may be due to the development of coarse crystals in the carbonless bands which occur in this material, and



Figs. 7, 8 and 9.—The Microstructure at 150 Diameters of the Steel Corresponding to the Various Forms of Heat Treatment Referred to in Table 2

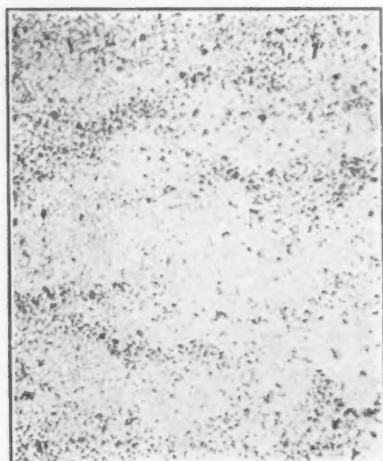


Fig. 10—Microstructure of Plate No. 2. Used Experimentally. Very little banding present, the plate being only $\frac{1}{2}$ in. thick

Phenomena which are now recognized as coming under the general title of grain growth were discovered and described by Stead¹ and Charpy². A considerable advance in our knowledge of the subject was, however, made by Sauveur,³ who made the well-known experiment of straining by compression a conical piece of nearly pure iron, and subsequently annealing the piece thus treated at a temperature below the lowest critical point. On cutting a section and etching it, a band of very large ferrite crystals was found at one point, and this led to the view that there is a critical amount of plastic deformation which, for a given annealing temperature, below the critical range produces very rapid grain growth.

The subject has been more fully investigated by Chappell,⁴ and has also been dealt with in America by Sherry.⁵ The latter author has shown that grain growth occurs, not only in comparatively pure iron, but in any region existing in a mass of mild steel from which pearlite is absent or nearly absent—in the carbonless bands such as those met with in boiler plates, provided, of course, that the necessary treatment, consisting of plastic deformation of the right intensity followed by annealing at a correspondingly low temperature, has been applied.

In view of the results obtained by the authors just referred to, the observations made on the boiler plate which forms the subject of this paper at once suggested that the development of coarse ferrite crystals in the carbonless bands of the plate was the result of grain growth following upon deformation in the cold and subsequent low temperature annealing. When it is borne in mind that this plate was bent cold and then annealed several times in succession, it will be seen that the conditions likely to produce grain growth in carbon-free areas had been present.

The authors, however, were not satisfied with a general inference of this kind, but endeavored experimentally to reproduce the conditions under which the steel had developed the coarse and relatively brittle structure which it possessed when received. For this purpose two series of experiments were undertaken. In both series the material was first normalized in order to destroy the previously existing coarse crystals and to bring the material into the condition in which it gives a satisfactorily high impact figure. Deformation was then applied to the material in two ways; in one case, in the cold (by hammering), and in the second case at a temperature between 600 and 700 deg. C., or below the critical range. Specimens treated in both ways were then annealed at 650 deg. C. for 30 min. The microstructure was examined both before and

the possibility is suggested that the failure of this plate may be connected with the phenomenon of grain growth which has in recent years been discovered in the case of iron and very low carbon steel.

The subject of grain growth is of fundamental importance in connection with the further investigation of this plate, and it is referred to it in greater detail at this point.

after this last annealing, and impact tests were taken on the material at each stage.

The resulting structure in one of the carbonless areas of the specimen which has been hammered in the cold and subsequently annealed at 650 deg. C. is shown in Fig. 6 under a magnification of 150 diameters. Comparison with Fig. 5 shows at once that considerable grain growth has taken place, although the resulting grains are not quite so large or well developed as those in Fig. 4. The sample which has been hammered between 600 and 700 deg. C. gives a very similar structure, and the impact figure in this case is brought down to 1.56 kgm. per sq. cm.

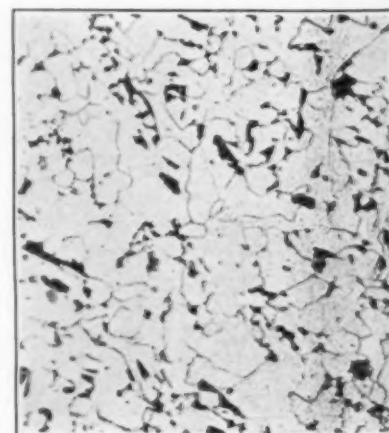
In order to test the matter further another series of experiments was undertaken in which varying amounts of mechanical deformation were applied in the cold followed by annealing at 650 deg. C. In order, however, to prove that it was not the annealing process alone which resulted in the reduction of the impact figure, the normalized sample was also annealed at 650 deg. C. without previous mechanical deformation. The results obtained by impact tests on specimens thus treated are given in Table 2:

Table 2—Tests on Boiler Plate No. 1

Treatment	Resistance to Impact. Kilogrammeter per Square Centimeter
Normalized at 900 deg. C.	10.46
Normalized at 900 deg. C.	8.92
Normalized; annealed at 650 deg. C.	9.04
Normalized; severely deformed; annealed, 650 deg. C.	11.7
Normalized; reduced 12.4 per cent; annealed, 650 deg. C.	10.66
Normalized; reduced 7.1 per cent; annealed, 650 deg. C.	8.44
Normalized; reduced 6.9 per cent; annealed, 650 deg. C.	10.04
Normalized; reduced 4.9 per cent; annealed, 650 deg. C.	8.14
Normalized; reduced 3 per cent; annealed, 650 deg. C.	6.34

In this table the amount of mechanical deformation is measured by percentage reduction of thickness produced by pressing in the cold in a powerful press.

The results given in Table 2 are instructive. It will be seen that large amounts of reduction actually improve the impact strength slightly, but with decreasing amounts of mechanical deformation followed by low temperature annealing the impact strength is very much reduced, although the lowest value obtained in this way, 6.34 kgm. per sq. cm., is still very much better than that found in the plate in its condition as received, or that described in the hammered sample given above. There is nothing to suggest, however, that hammering, as distinct from such deformation as occurs in cold bending, has any



Figs. 11, 12 (Upper), 13 and 14 (Lower) After the Treatment

¹Stead, *Journal of the Iron and Steel Institute*, 1898, No. I, p. 145; *ibid.*, No. II, p. 137.

²Charpy, *Comptes Rendus*, vol. cli.

³Sauveur, *Proceedings of the International Congress for Testing Materials*, Sixth Congress, 1912, vol. xi.

⁴Chappell, *Journal of the Iron and Steel Institute*, 1914, No. I, p. 460.

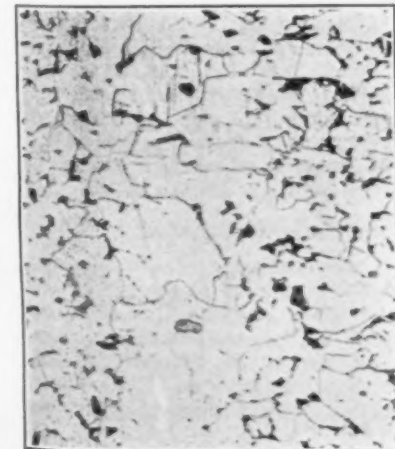
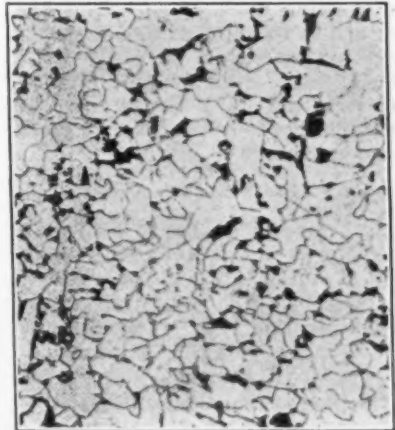
⁵Sherry, *Faraday Society*, December, 1916.

specific effect. It should further be borne in mind that when a thick plate is bent in the cold, a considerable range of plastic deformation is produced, ranging from a maximum at the surface of the plate to zero at the neutral axis. Somewhere within this range the critical deformation, corresponding to the annealing temperature employed, is likely to occur.

The microstructure corresponding to the various forms of treatment referred to in Table 2 are illustrated in Figs. 7, 8 and 9, at a magnification of 150 diameters. Fig. 7 refers to the last specimen mentioned in the table, having the lowest impact figure and correspondingly showing the largest development of grain growth in the carbonless bands. Fig. 8 refers to the material as normalized and annealed at 650 deg. C. without intermediate deformation. It will be seen that here there is no appreciable difference in grain size between the carbonless band and the adjacent steel. Finally, Fig. 9 refers to the material which has been severely deformed and subsequently annealed at 650 deg. C., giving a high impact figure. Here it will be seen that the grain has been very much refined even in the carbonless areas, and this corresponds in a striking manner with the very high impact figure, 11.7.

When the evidence above described is carefully considered, it will be seen to afford a considerable degree of proof of the view that the brittleness, as evidenced by the very low impact figures and actual failure in manufacture which has been found in the plate under discussion, arises from the existence of coarse ferrite crystals due to grain growth in the carbonless bands of the steel, and that this grain-growth is the result of a moderate amount of deformation in the cold, followed by low temperature annealing. It is further evident that normalizing the material, or indeed merely heating it to a temperature above the critical range, is sufficient entirely to obliterate this grain growth and all its evil effects.

It will be seen that this conclusion indicates that the presence of carbonless bands, which is regarded as a normal feature and has not hitherto been considered a



ower)—Microstructure of Plate No. 2
Outlined in Table 3

serious source of danger or weakness in a boiler plate, may become the cause of failure if associated with a suitable combination of mechanical deformation and low temperature annealing. If carbonless bands are to be regarded as a normal feature in boiler plates—and in existing practice this is probably inevitable—and if deformation in the cold, such as bending, etc., is otherwise a desirable practice, it seems that subsequent normalizing is necessary, or certainly desirable, as a safeguard against dangers of the kind described here.

In order further to test the view which has been advanced above, the authors have endeavored to carry out similar ex-

periments and tests on other samples of boiler plate, but the other samples at their disposal came in every case from plates of much smaller size and thickness, with the result that the banding, where it existed to a marked extent, was on a much smaller scale. Experiments on these plates were, however, made, in order that the results might be regarded as a check on the observations already described. In the case of a plate half an inch thick, which may be referred to as No. 2, the chemical analysis was as follows:

	Per Cent		Per Cent
Carbon	0.123	Phosphorus	0.057
Silicon	0.014	Manganese	0.49
Sulphur	0.03		

which again indicates a steel of satisfactory composition. The general microstructure of this plate in the condition as received is shown in Fig. 10. A certain amount of banding is present, but not on the scale found in the first plate described. A piece of this plate was normalized at 950 deg. C., and portions were subsequently treated as follows:

- Hammered cold and annealed at 650 deg. C.
- Hammered between 600 and 700 deg. C., and annealed at 650 deg. C.
- Annealed at 650 deg. C. without previous mechanical treatment.

Impact tests have subsequently been carried out on the samples thus treated, with the results given in Table 3:

Table 3—Tests of Boiler Plate No. 2

Treatment	Energy to Fracture, Kilogrammeters.
As normalized at 950 deg. C.....	11.06
Normalized at 950 deg. C.; hammered cold and annealed at 650 deg. C.....	5.52
Normalized, 950 deg. C.; hammered between 600 deg. C. and 700 deg. C., and annealed at 650 deg. C.....	7.18
Normalized at 950 deg. C., annealed at 650 deg. C. without mechanical treatment.....	10.44

It will be seen that the normalized material again gives a high value, and that this value is not appreciably diminished by a further annealing at 650 deg. C. On the other hand, cold hammering followed by annealing at 650 deg. C. lowers the impact figure to one-half of the normal value, while hammering between 600 and 700 deg. C. reduces it considerably but to a lesser extent. The corresponding microstructures are illustrated in Figs. 11, 12, 13 and 14. Fig. 11 shows the material as normalized, Fig. 12 shows it after normalizing and reannealed at 650 deg. C. without mechanical treatment, Fig. 13 shows the effects of cold hammering followed by annealing at 650 deg. C., and Fig. 14 shows the effect of hammering between 600 and 700 deg. C., followed by annealing at 650 deg. C.

It will be seen that, in general terms, the results obtained with this material are of the same kind as those found in the first plate, but, probably owing to the smaller scale of the banding originally existing in this steel, the results are not quite so intense in character. It may be mentioned that this plate also had failed in practice, but not during manufacture, and in a manner which is not necessarily related to the phenomenon of grain growth. The experiments on this plate serve to confirm the observations made with the first example, but they indicate that in plates of a

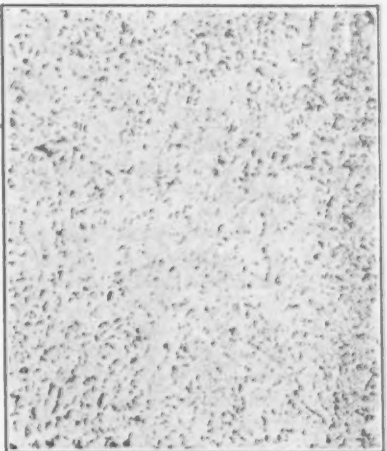


Fig. 15.—Microstructure of Another
1/2 In. Plate Used by the Authors
Experimentally in the Original Paper.
There is an absence of marked banding

smaller thickness the effects are not likely to be so serious as in the larger plates.

The results obtained with plates Nos. 2 and 3 thus confirm the view that the low impact figures found in the first plate, and to a lesser extent in plate No. 2, are associated with the coarse crystal structure in the carbonless bands, and that these are the result of grain growth produced by slight deformation and subsequent low temperature annealing; also that normalizing in every case completely removes this source of weakness.

Women in British Rolling Mills

Not long ago a report was made by the Principal Lady Inspector of Factories in Great Britain showing how much heavy work was then being efficiently and willingly done in iron and steel works by women which, until a year ago, was thought to be utterly beyond their physical powers and to necessitate the employment of men of great strength as well as of the skill that comes of long practice. Further interesting evidence of woman's ability in time of stress to do work which men alone have hitherto been thought capable of doing has come to light recently, says the *London Ironmonger*, in connection with the work of rolling steel. It is notorious that the military "clean cut" of all grade 1 men of 23 and under is strenuously opposed by the proprietors of the rolling mills, who contend that its enforcement will interfere with munitions production and imperil national interests. The *Ironmonger* adds: "As steel rolling is a key operation upon which innumerable trades depend for their raw material, any considerable reduction of the producing power of the mills would prove disastrous, and the rolling-mill owners are almost unanimous in declaring emphatically that the substitution of women for men would not be of the slightest use to them. They contend that, apart from skill, rolling is too hot, too dangerous, and too heavy work for women. The output of their mills, they say, was reduced substantially by the first 'clean cut,' and a further call-up would mean a permanent reduction of capacity of at least 50 per cent.

"The soundness of this attitude is now being put to the test, and it is not unlikely that it may share the fate of many other once deeply rooted but now exploded dogmas. About a dozen young women were put to steel rolling in this country (we believe that women have been doing similar work in Germany for the past two years) recently, at the Clay Wheel Rolling Mill Co.'s plant, near Sheffield, and we have had an opportunity of seeing them at work. After a few days' experience the girls, we were informed, made efficient substitutes for an equal number of youths who have gone into the army, and within a couple of weeks the company, by their aid, had made good the greater part of the loss resulting from enlistment. Their task was the reduction of 50-lb. billets to rods of 1½ in. diameter. All the work behind the rolls is done by women, and some of them are now employed in charging the billets into the furnaces. The women, who are handling the hot metal with dexterity and apparent ease, are neatly dressed in trousers and long overalls; they look clean, healthy and contented, and they are superior in physique to the average boy employed on such work.

"Time alone must settle the question whether the employment of women in rolling mills can become general, but the management of the Clay Wheel mills is satisfied that it will be possible to carry female dilution in the industry to a considerable extent and to lessen appreciably the need for young men. The experiment does not extend to forging for the trade, which is almost as important a manipulation as rolling, and calls for more skill and physical endurance.

"The introduction of large numbers of women into rolling mills would be most opportune just now from another viewpoint, because it might solve the difficulty of enforcing discipline upon the mill boys. Many lads between 14 and 16 are employed on rolling steel whose work is indispensable to the running of the mills. They earn from 30s. to 50s. a week, and during the war they have got completely out of hand. They work or play

as they please, and for a mere whim one of them will leave his job and stop the work of half a dozen men, and probably take his companions with him. Stoppages of plant from this cause are almost of daily occurrence, and result in a serious loss of output. The employers have no legal remedy, and since leaving certificates were suspended there is no appeal to the Ministry of Munitions. The Employers' Association is now agitating in favor of the restoration of the leaving certificate for workers under 16 years of age, and if this is agreed to it will be possible to proceed against boys who lose time or leave their jobs. It is not the employers alone who feel aggrieved; the unruliness of boys also makes serious inroads into the earnings of the men, and they are as anxious as the employers to find a remedy. Extensive dilution by women's labor would go a long way to supply it."

Farm Implements for Europe

WASHINGTON, Sept. 10.—America must supply Europe's needs for farm implements after the war. Particularly will there be a demand for tractors to speed up Europe's food production, says a special report sent to the Department of Commerce by Pierce C. Williams, commercial attache in the American Embassy at Paris, whose report on "America's Participation in the Reconstruction of the Devastated Regions of France," published in *THE IRON AGE* of Sept. 5, has aroused much interest.

The new report was prepared for Mr. Williams by an American expert in the manufacture and use of tractors.

"As soon as the war is over," says the report, "there will inevitably be a tremendous demand for modern farming implements of all kinds, and price will not be so important a factor as quick deliveries. It is the one manufacturing line in which, after the war, there will be an urgent and almost unlimited demand from a class of buyers having a perfect capacity for prompt payment.

"American manufacturers of tractors and, in fact, of all classes of agricultural machinery, must increase their capacity if the pressing needs of American and European agriculture are to be supplied and economic maladjustment avoided. They should be ready for a large backed-up demand from Europe for all classes of farm machinery. They should be prepared to make large and immediate shipments the moment that peace makes shipping space available."

Only three reversing rolling-mill plants with electrical drive were actually at work in Great Britain on March 15, although a considerable number were at that time under construction. The hesitation shown in that country in adopting this type of drive for a long time prior to the war, according to *Engineering*, London, is attributable to too insufficient average return on capital invested in iron and steel manufacture to induce directors to sanction such installations.

The Booth-Hall Co., Chicago, electric furnace builder and metallurgist, has moved its sales and administrative offices from 565 West Washington Boulevard to 2309 Archer Avenue, where only the engineering and construction departments have heretofore been located. By this change all departments of the business are combined, and the furnaces in course of construction are at all times under the inspection of the officials of the company.

An executive committee consisting of the following members of the board was appointed at the first meeting of new directors of the Canadian Car & Foundry Co.: N. Curry, W. F. Augus, Mark Workman, C. P. Beaubien, W. M. Butler, K. W. Blackwell, H. W. Beauclerk. Election of Senator Curry as president and W. W. Butler as vice-president and managing director was confirmed.

Preference List of Industries is Issued

Those Regarded as Essential Are Placed in Four Classes—Every Plant Not Reporting Monthly Will Be Dropped—Board Explains Its Policy

WASHINGTON, Sept. 10.—The War Industries Board has issued the long awaited preference list of industries which are regarded as essential to the war program of the Government. The list is divided into four classes in the order of their war importance.

This is the most important list of industries which has been compiled by the Government, and it is to be the "master key" which will govern all departments in their relations to industry. Just now it is of prime importance because it will affect the deferred classifications under the selective service draft. From an industrial standpoint it is even more important because it will determine every question of priority. It will be the governing factor in the distribution of labor, capital, facilities, material, transportation and fuel. It supersedes all previous lists issued by the War Industries Board or any other organization of the Government.

In sub-dividing the list into the four classes, the Priorities Division of the board gave consideration to the following factors: (1) Intrinsic importance of the product for use during the war and the urgency; (2) necessity for maintaining or stimulating and increasing the total quantity of production; (3) proportion of the capacity of the industry or plant devoted to the production of essential products.

Hopes for Good Results

By putting all of the preferred industries into this list, the War Industries Board feels that it has made it possible to maintain a well balanced program with respect to all of the factors that enter into production. It will put an end to the conflict which sometimes has hindered an even distribution of important items. For instance, there have been many cases in which the Fuel Administration had given greater preference to an industry than the War Industries Board could allow in the distribution of material. In the past these differences have been worked out by direct contact between the various boards. Hereafter they will be governed completely by the new list.

The schedule is the chief manifestation of the "common, consistent and concerted action" which the War Industries Board has sought to secure in all questions of priority, by the creation of the Priorities Board. The chairman of this organization is Edwin B. Parker, Priorities Commissioner of the War Industries Board. The other members of the commission who helped to draw up the present list are Chairman Baruch of the War Industries Board, Chairman Frankfurter of the War Labor Policies Board, and representatives of the Railroad Administration, the United States Shipping Board Emergency Fleet Corporation, the War Trade Board, the Food Administration, the Fuel Administration, the War Department, the Navy Department, and the Allied Purchasing Commission.

Treatment of Some Plants

Although the list has been made as inclusive as possible, it has been found that in numerous instances individual plants were entitled to preference because they were indirectly engaged in war work, although the industries to which they belong were not entitled to such priority. In other instances, industries have been accorded a degree of preference while particular plants in these industries have been given a higher classification. This has necessitated classifying and listing not only industries as such but to a limited extent individual plants, some of which are accorded a higher rating than that given to the listed industry to which they belong.

The preference list is made up of industries and plants which in the public interest are deemed entitled to preferential treatment. The inclusion of these in-

dustries and plants on this list does not operate as an embargo against all others, but the effect is to defer the requirements of all other industries and plants until the requirements of those on the preference list shall have been satisfied.

Divided Into Four Classes

In the compilation of this list, industries and plants have been divided according to their relative importance into four classes, viz.: class 1, class 2, class 3 and class 4. In determining such relative importance consideration and weight have been given not solely to any one but to all of the following factors: (1) the intrinsic importance of the product itself for use during the war, and the urgency, as measured by time, of the demand or of the use to which it is to be put; (2) the necessity for maintaining or stimulating and increasing the total quantity of production, which in turn depends largely upon the relation of the supply to the demand for essential uses; (3) the proportion of the capacity of the industry or plant which is devoted to the production of the essential product.

"Where it is imperative," says the statement of the Priorities Commission, "not only to maintain but to stimulate and increase production to satisfy abnormal demands created by war requirements, a high rating is necessary, even though the intrinsic importance of the product may be less than that of other products placed in a lower classification due to the fact that the supply of such other products equals the demand without the stimulus of high priority. Where it is necessary to speed the production of a particular product required at a particular time to carry into effect an important program, a high priority is given, although changing conditions may thereafter suggest and demand a re-classification. Certain plants produce commodities of great relative importance, but at the same time produce other commodities of less relative importance, and under such circumstances consideration and weight are given to the ratio of production between the more important and less important commodities. Instances occasionally arise where individual plants are given preference so long as they are rendering, and so long as it is in the public interest that they should render, a particular service, even though, taking the country as a whole, the supply of their product is ample to meet all demands."

No Significance in Order

No distinction has been made between any of the industries or plants within any one class and no significance attaches to the order in which industries and plants are listed within any class.

The industries and plants grouped under class 1 are only such as are of exceptional importance in connection with the prosecution of the war. Their requirements must be fully satisfied in preference to those of the three remaining classes.

Requirements of industries and plants grouped under class 2, class 3 and class 4 shall have precedence over those not appearing on the preference list. As between these three classes, however, there shall be no complete or absolute preference. The division into classes is for the purpose of presenting a composite picture of the relative importance of the industries and plants embraced within each group. It is not intended that the requirements of class 1 shall be fully satisfied before supplying any of the requirements of class 3, or that those of class 3 shall be fully satisfied before supplying any of those of class 4. The classification does, however, indicate that the industries and plants grouped in class 2 are relatively more important than those of class 3 and that those in class 3 are relatively more important than those in class 4. It will often happen that

after satisfying the requirements of class 1 the remaining available supply will be less than the aggregate requirements of the other three classes, in which event such supply will be rationed to the industries and plants embraced within those classes. In determining a basis for such rationing, the relative importance of each industry and plant, according to its class rating, must be considered. It has been found impracticable to prescribe for rationing purposes any general and uniform rule or formula, but the Priorities Board will from time to time, after conference, and in co-operation with each of the several governmental agencies charged with the distribution thereof, determine particular principles, values and methods of application which may be followed in allocating fuel, power, transportation and labor respectively, to the end that proper recognition and weight may as far as practicable in each case be given to the relative importance of class 2, class 3 and class 4.

Must File Reports

Among the other regulations provided by the Priorities Board concerning this list are the following:

Each plant listed shall not later than the fifteenth of each month file with the Secretary of the Priorities Board, Washington, a report on P. L. Form No. 3 (a supply of which will be furnished on application) covering its activities during the preceding month. Any plant failing to file such report will be dropped from the preference list.

Priorities in the supply and distribution of raw materials, semi-finished products and finished products shall be governed by Circular No. 4 issued by the Priorities Division of the War Industries Board under date of July 1, 1918, and all amendments and supplements thereto or substitutes therefor.

The term "principally" as used in listing industries shall be construed to mean plants whose output is not less than 75 per cent of the products mentioned.

This preference list shall be amended or revised from time to time by action of the Priorities Board to meet changing conditions. The Priorities Commissioner shall, under the direction of and with the approval of the Priorities Board, certify additional classes of industries and also certify additional plants whose operations as a war measure entitle them to preferred treatment, which industries and plants when so certified shall be automatically included in the preference list.

Embargo Not Declared

"The inclusion of the industries and plants on this preference list," said Priorities Commissioner Parker in discussing its issue, "does not operate as an embargo against all others, but the effect is to defer the requirements of all other industries and plants until the requirements of those on the preference list shall have been satisfied. The paramount purpose of priorities is the selective mobilization of the products of the soil, the mines and factories for direct and indirect war needs in such a way as will most effectually contribute toward winning the war.

"In listing industries as such or individual plants, while a number of factors are taken into account, the ultimate test is: to what extent, if at all, will according preference contribute directly or indirectly toward winning the war; and, if at all, how urgent is the need?

Meaning of Classification

"A high priority classification does not always mean that the product of the industry or plant so classified is of greater intrinsic importance than those of industries and plants in a lower classification or not appearing at all on the preference list, but that taking into account the urgency of the demand and the relation of supply to demand, it is in the public interest that the artificial stimulus of priority should be applied. All priority is relative and implies purposeful discrimination.

"Without a central agency to determine the relative needs, importance and urgency of the requirements of each department of this Government, of its Allies and of the civilian population, there would be hopeless conflict and confusion. The unprecedented expansion of the Army and of the Navy of the United States, the creation of the Emergency Fleet Corporation to engage in shipbuilding on an extraordinary scale, and the demands made by our Allies for munitions, material,

equipment, fuel, foods and feeds—the abrupt change from a peace to a war basis—have all combined to create abnormal industrial conditions in the United States, to regulate which the law of supply and demand and other economic laws applicable to normal conditions are wholly inadequate. The administration of priorities is calculated to bring order out of chaos and to develop an evenly balanced industrial program to meet the requirements of the military program, and at the same time supply the essential requirements (as distinguished from the mere wants or desires) of the civilian population. Now that it is understood that priority and preference cannot be purchased, the tendency is for prices to assume more nearly the normal level. It is now the public interest rather than the dollars of the purchaser that determines precedence in production and delivery."

The list, with the classification of each industry, follows, in alphabetical order:

The Official List.

(The term "principally" means 75 per cent of the products mentioned)

- AIRCRAFT—Plants engaged principally in manufacturing aircraft or aircraft supplies and equipment, class 1.
- AMMUNITION—Plants engaged principally in manufacturing same for the United States Government and the Allies, class 1.
- ARMY AND NAVY—Arsenals and Navy Yards, class 1.
- ARMY AND NAVY—Cantonments and Camps, class 1.
- ARMS (small)—Plants engaged principally in manufacturing same for the United States Government and the Allies, class 1.
- BAGS—Hemp, jute and cotton—Plants engaged principally in manufacturing same, class 4.
- BLAST FURNACES—Producing pig iron, class 1.
- BOOTS AND SHOES—Plants engaged exclusively in manufacturing same, class 4.
- BRASS AND COPPER—Plants engaged principally in rolling and drawing copper brass and other copper alloys in the form of sheets, rods, wire and tubes, class 2.
- BUILDINGS—See public institutions and buildings.
- CHAIN—Plants engaged principally in manufacturing iron and steel chain, class 3.
- CHEMICALS—Plants engaged principally in manufacturing chemicals for the production of military and naval explosives, ammunition and aircraft, and use in chemical warfare, class 1.
- CHEMICALS—Plants, not otherwise classified and listed, engaged principally in manufacturing chemicals, class 4.
- COKE—Plants engaged principally in producing metallurgical coke and by-products, including toluol, class 1.
- COKE—Plants, not otherwise classified and listed, producing same, class 2.
- COPPER AND BRASS—See brass and copper.
- COTTON—Plants engaged in the compression of cotton, class 4.
- CRANES—Plants engaged principally in manufacturing locomotive or travelling cranes, class 2.
- DOMESTIC CONSUMERS—Fuel and electric energy for residential consumption, including homes, apartment houses, residential flats, restaurants and hotels, class 1.
- DOMESTIC CONSUMERS—Fuel and electric energy not otherwise specifically listed, class 3.
- DRUGS—Medicines and medical and surgical supplies, plants engaged principally in manufacturing same, class 4.
- ELECTRICAL EQUIPMENT—Plants engaged principally in manufacturing same, class 3.
- EXPLOSIVES—Plants engaged principally in manufacturing same for military and naval purposes for the United States Government and the Allies, class 1.
- EXPLOSIVES—Plants, not otherwise classified or listed, engaged principally in manufacturing same, class 3.
- FARM IMPLEMENTS—Plants engaged principally in manufacturing agricultural implements and farm operating equipment, class 4.
- FEED—Plants engaged principally in preparing or manufacturing feed for livestock and poultry, class 1.
- FERROALLOYS—Plants engaged principally in producing ferrochrome, ferromanganese, ferromolybdenum, ferrosilicon, ferrotungsten, ferroureanum, ferrovanadium and ferrozirconium, class 2.
- FERTILIZERS—Plants engaged principally in producing same, class 4.
- FIRE BRICK—Plants engaged principally in manufacturing same, class 4.
- FOODS—Plants engaged principally in producing, milling, refining, preserving, refrigerating, wholesaling or storing food for human consumption embraced within the following description: All cereals and cereal products, meats, including poultry, fish, vegetables, fruit, sugar, syrups, glucose, butter, eggs, cheese, milk and cream, lard, lard

- compounds, oleomargarine and other substitutes for butter or lard, vegetable oils, beans, salt, coffee, baking powder, soda and yeast; also ammonia for refrigeration, class 1.
- FOODS**—Plants engaged principally in producing, milling, preparing, refining, preserving, refrigerating or storing food for human consumption not otherwise specifically listed, excepting herefrom plants producing confectionery, soft drinks and chewing gum, class 3.
- FOOD CONTAINERS**—Plants engaged principally in manufacturing same, class 4.
- FOUNDRIES (IRON)**—Plants engaged principally in the manufacture of grey iron and malleable iron castings, class 4.
- GUNS**—(Large)—Plants engaged principally in manufacturing same for the United States Government and the Allies, class 1.
- ICE**—Plants engaged principally in manufacturing same, class 3.
- INSECTICIDES AND FUNGICIDES**—Plants engaged principally in manufacturing same, class 4.
- LAUNDRIES**, class 4.
- MACHINE TOOLS**—Plants engaged principally in manufacturing same, class 2.
- MINES**—Coal, class 1.
- MINES**—Producing metals and ferroalloy minerals, class 2.
- MINES**—Plants engaged principally in manufacturing mining tools or equipment, class 3.
- NEWSPAPERS AND PERIODICALS**—Plants engaged principally in printing newspapers or periodicals which are entered at the post office as second class mail matter, class 4.
- OIL AND GAS**—Plants engaged principally in producing oil or natural gas for fuel, or for mechanical purposes, including refining or manufacturing oil for fuel, or for mechanical purposes, class 1.
- OIL AND GAS**—Pipe lines and pumping stations engaged in transporting oil or natural gas, class 1.
- OIL AND GAS**—Plants engaged principally in manufacturing equipment or supplies for producing or transporting oil or natural gas, or for refining and manufacturing oil for fuel or for mechanical purposes, class 3.
- PUBLIC INSTITUTIONS AND BUILDINGS (Maintenance and operation of)**—Other than hospitals and sanitariums, class 3.
- PUBLIC INSTITUTIONS AND BUILDINGS (Maintenance and operation of)**—Used as hospitals or sanitariums, class 1.
- PUBLIC UTILITIES**—Gas plants producing toluol, class 1.
- PUBLIC UTILITIES**—Street railways, electric lighting and power companies, gas plants not otherwise classified, telephone and telegraph companies, water supply companies, and like general utilities, class 2.
- PUBLIC UTILITIES**—Plants engaged principally in manufacturing equipment for railways or other public utilities, class 2.
- PULP AND PAPER**—Plants engaged exclusively in manufacturing same, class 4.
- RAILWAYS**—Operated by United States Railroad Administration, class 1.
- RAILWAYS**—Not operated by United States Railroad Administration (excluding those operated as plant facilities), class 2.
- SHIPS (Maintenance and operation of)**—Excluding pleasure craft not common carriers, class 1.
- SHIPS**—Plants engaged principally in building ships, *excluding* (a) pleasure craft not common carriers, (b) ships not built for the United States Government or the Allies nor under license from United States Shipping Board, class 1.
- SOAP**—Plants engaged principally in manufacturing same, class 4.
- STEEL MAKING FURNACES**—Plants engaged solely in manufacturing ingots and steel castings by the open hearth, Bessemer, crucible or electric furnace process, including blooming mills, billet mills and slabbing mills for same, class 1.
- STEEL PLATE MILLS**, class 1.
- STEEL RAIL MILLS**—Rolling rails 50 or more pounds per yd., class 2.
- STEEL**—All plants operating steel rolling and drawing mills exclusive of those taking higher classification, class 3.
- TANNERS**—Plants engaged principally in tanning leather, class 4.
- TANNING**—Plants engaged principally in manufacturing tanning extracts, class 4.
- TEXTILES**—Plants engaged principally in manufacturing cotton textiles, including spinning, weaving and finishing, class 4.
- TEXTILES**—Plants engaged principally in manufacturing woolen textiles, including spinners, top makers and weavers, class 4.
- TEXTILES**—Plants engaged principally in manufacturing cotton or woolen knit goods, class 4.
- TEXTILES**—Plants engaged principally in manufacturing textile machinery, class 4.
- TIN PLATE**—Plants engaged principally in manufacturing same, class 3.
- TOBACCO**—Only for preserving, drying, curing, packing and storing same—not for manufacturing and marketing, class 4.
- TOOLS**—Plants engaged principally in manufacturing small or hand tools for working wood or metal, class 3.
- TWINE (BINDER AND ROPE)**—Plants engaged principally in manufacturing same, class 4.
- WAR AND NAVY DEPARTMENTS**—Construction work conducted by either the War Department or the Navy Department of the United States in embarkation ports, harbors, fortified places, flood protection operations, docks, locks, channels, inland waterways and in the maintenance and repair of same, class 2.
- WIRE ROPE AND ROPE WIRE**—Plants engaged principally in manufacturing same, class 2.

Procedure for Exemption of Workers

WASHINGTON, Sept. 10.—The procedure of the exemption of workers in essential industries from the provisions of the new draft law which has just been announced by Provost Marshal General Crowder paves the way for a much broader application of the deferred classifications than was originally proposed. Under these regulations, the industrial, or occupational, advisers assigned to each local board are to have power to initiate these exemptions on their own account, even though no claim for exemption is made either by the individual registrant or by his employer.

This change is largely the result of pressure from the War Industries Board and other governmental agencies which have been worrying over the continually decreasing supply of essential man power in the country's war industries. They have found that to rely upon the individual claims for exemption would be insufficient, as it has been difficult to convince many of the workers that no stigma attaches to such a claim. At the same time, there has been difficulty also in educating employers generally to the necessity for these claims. For that reason the new rules provide that the industrial advisers may make these claims.

Duties of Advisers

On this point, the new rules which have just been promulgated say:

"Such advisers shall, under rules to be prescribed by the local boards, have access to the questionnaires and other records in the files of the local boards, and shall confer with persons engaged in the various in-

dustries, occupations and employments for the purpose of having the cases of certain individual registrants, by whom or in whose behalf no claim for deferred classification has been made, presented to the district board for consideration and determination as to whether or not such registrants should be placed in a deferred class.

"If any such adviser files with the district board a claim for deferred classification on the ground of a registrant being engaged in a necessary industry, occupation or employment, including agriculture, the district board shall forward such claim to the local board having jurisdiction, and upon receipt thereof it shall be the duty of such local board to certify the questionnaire and record of any such registrant to the district board for consideration, although no claim by or in respect of such registrant for deferred classification has been made or such registrant has waived deferred classification; provided the day and hour fixed to report for such military duty has not arrived. If the information and the affidavits necessary for the classification of the registrant because of his engagement in a necessary industry, occupation or employment, including agriculture, are not contained in the questionnaire of such registrant, it shall be the duty of such local board to give the opportunity by reasonable extension of time to those interested in obtaining a deferred classification, to furnish the information and supply the affidavits required by the questionnaire and the regulations.

(Continued on page 642)

Taking the Pattern Shop Out of the Attic

Cleveland Pattern Maker Believes the Business Should Be Banished from Dingy Quarters and Puts His Ideas Into Effect

—BY F. L. PRENTISS—

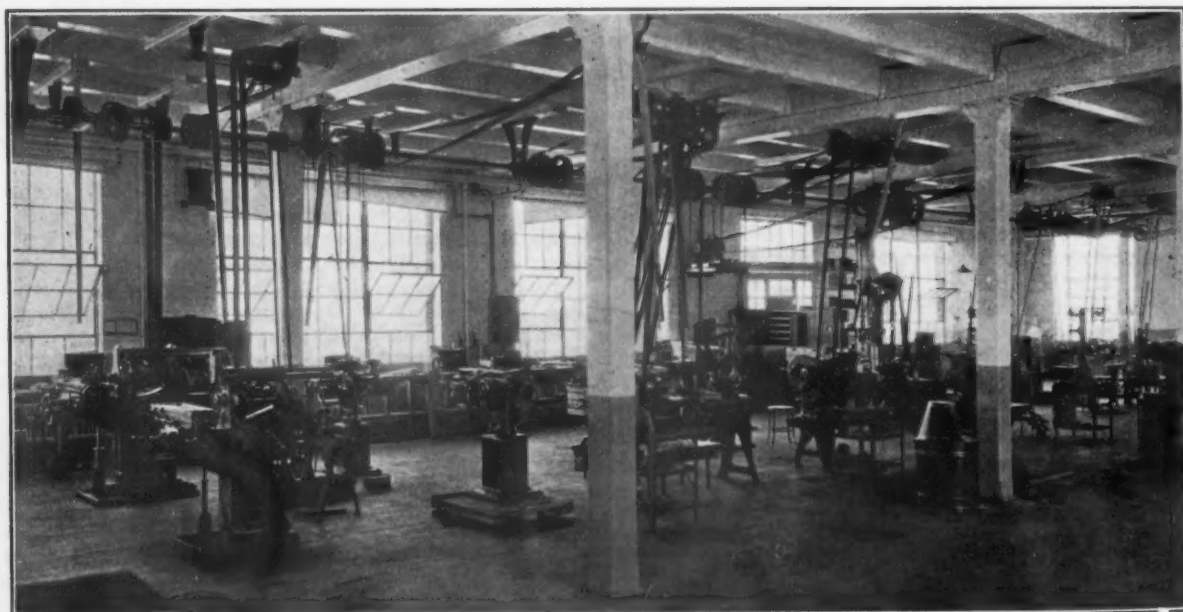
A. P. SCHRANER, a Cleveland pattern maker, became possessed with the idea that the commercial pattern-making business needed elevating, that the pattern shop should be taken out of the dingy room in the back corner of the top of a somewhat dilapidated factory building reached by two or more flights of narrow dark stairways where it is still often found and should be placed on an equal footing with other manufacturing lines. There was no reason why other manufacturers should not take their hats off to the pattern maker, he argued. He believed that it would be good business to have a pattern shop that one would be proud to show to his customers and a place for his men to work that for convenience, light, ventilation, etc., would be equal to any other shop, and that in such a shop a higher grade of workmen would be secured and work of a better quality turned out. Like most owners of pattern shops Mr. Schraner got his start at the bench and 18 years ago he embarked in business for himself with \$5 in cash and his training at his trade as his capital.

Carrying out his ideas for uplifting the pattern-making industry Mr. Schraner has recently built a new commercial pattern-making shop on a main thoroughfare in Cleveland, being located on Payne Avenue at Thirty-third Street, and convenient to a large manufacturing district. His business now occupies a modern type of factory building, 60 x 110 ft., two stories in height, the lower floor being used for making metal patterns and for experimental work and the upper floor for wood patterns. The building is of the slow-burning mill type of construction with tapestry brick sidewalls and an abundance of clear glass window surface in Fenestra steel sash. The building is very substantial in construction and its exterior appearance is unusually neat. It is designed for the addition of a third story when more room is needed. The ceil-

ings are high, being 14 ft. above the floors. The interior, including the ceiling, is covered with white enamel excepting about 4 ft. above the floors on the sidewalls and columns, which are of the same material in gray. With the white walls, ample window surface and absence of partitions, all parts of the shop are well lighted. A somewhat unusual feature is the provision of white canvas shades to shut out the glare of the sun. These are so made that the canvas can be taken from the fixtures and washed when soiled. The second floor is served by a 10 x 14-ft. Edwards elevator, which is large enough to handle most of the larger patterns. In case a pattern is too large to go in the elevator it is handled from the second floor through a rear door and let down to the ground from an I-beam which extends out from the building above the door.

The ground floor is built of 5-in. concrete laid on 8 in. of cinders, and above the concrete are two thicknesses of 1 x 2½-in. tongue and groove maple flooring, one thickness laid each way. A floor of this strength was provided so that machinery could be located anywhere in the room. The upper floor is 1-in. maple laid on 3-in. matched pine. Concrete stairways connect the two floors at the front and rear, the former leading to the office, which is separated from the wood-pattern shop by a partition having a continuous glass section between the two rooms so that all parts of the shop are in full view of the office. Toilet facilities, lockers and wash-stands with hot and cold water are provided on each floor.

One section of the lower floor is used for the manufacture of metal patterns and the remainder for experimental work. The shop is equipped so that any kind of a job, fine or rough, can be handled and a customer can go to the plant with an idea, sketch it out on a drafting board and have the finished machine turned out without going to other



The First Floor of the Shop Is Devoted to the Making of Metal Patterns and Contains an Experimental Department



In the Wood Pattern Shop on the Second Floor the Machinery Is Located in the Center and Individual Benches for the Pattern Makers Are Placed at Right Angles to the Sidewalls

shops for machine work or castings. The equipment on this floor includes several high-grade lathes, the largest a 20-in. American lathe with complete attachments, a universal grinding machine, six drilling machines of various sizes from a small sensitive machine up, and an arbor press in addition to the usual metal-pattern shop equipment. All the machinery is motor driven. In one corner is a bench used for molding patterns for small metal castings in aluminum and white metal. This metal is melted in a gas-fired combination Frankfort melting and heat-treating furnace which is provided with two chambers that are used for heat-treating purposes. A bench is located along one sidewall in the experimental department and the metal-pattern makers have individual benches. Metal racks are used for storing patterns and there are some portable racks around the machines for holding tools. Under the lathes are specially designed pans 16 in. wide and 36 in. long standing on legs for catching the chips and turnings from the machines so that the floor is not littered up.

The machinery in the wood-pattern department on the second floor, including lathes and band and cross rip saws, is motor driven in two groups so that one section may be shut down in case the shop is not very busy. In addition, there are a number of machines including a band sawing, wood and tool

grinding and jointing machines that are driven by individual motors, so that they may be used for overtime work when the groups of machines are not operating. In addition to the equipment more commonly found in pattern shops, there is a Besly grinding machine with both a disk and an oscillating and rotating head, the latter for inside grinding, and an American Woodworking Machinery Co.'s furniture-planing machine, this type being used as it has sufficient rolls to work up the short pieces of wood. Wood-pattern makers are provided with individual benches placed at right angles to the sidewall. These are 6 ft. long, 30 in. wide and have 3-in. maple tops. Each bench has a drawer and a glue pot is provided for each pattern maker.

The shop is conveniently arranged throughout so that supplies are easily accessible and can be found without waste of time. Brads, tacks, dowels, sandpaper and other supplies are kept in two cabinets, each with 27 drawers properly labeled, located adjoining building columns near the center of the shop, and near these cabinets are racks for fillets. Surplus stocks are kept in an inclosed stockroom provided with metal racks. The varnish department is in one corner away from the dust. Shavings and kindling are sent down a chute to a basement room adjoining the boiler room, in which the heating plant is located.

Freyn, Brassert & Co., consulting engineers, People's Gas Building, Chicago, have associated with themselves A. S. Knowles of St. Louis as consulting engineer on coal, coke and by-product matters. The new department will be under the direction of Mr. Knowles, furnish reports on coals and their coking qualities, investigate and report on by-product processes and by-product recovery gas producer plants and act in a consulting capacity in connection with the operation, design, purchasing and supervision of construction of by-product coke oven plants and similar equipment.

The Trumbull Steel Co., Warren, Ohio, has opened its books for the subscription of \$2,000,000 worth of common stock, being part of an issue authorized by the stockholders last May. Present common stockholders will be permitted to subscribe up to one-third of their present holdings. President Jonathan Warner in a letter to the stockholders announces that on account of war conditions it is necessary to carry larger stocks of raw material, resulting in a large increase in the inventory, and that a larger working capital is desired because of the abnormal war conditions.

A Preference List of Industries Given

(Continued from page 639)

Pending the final classification of such registrant, he shall not be inducted into the military service.

"It shall be the duty of such advisers to confer with the managers and heads of various industries, and those familiar with the needs in occupations and employments, including agriculture, and instruct such persons as to their right under the regulations to file a claim for deferred classification in respect of any registrant who has failed or refused to file a claim for deferred classification in his own behalf or who has waived his claim for deferred classification.

"If a local board determines to consider a case for deferred classification because the registrant is engaged in a necessary industry, occupation or employment, including agriculture, notwithstanding no claim for deferred classification on that ground has been made, the local board shall, after indorsing the recommendation on the questionnaire, forward the questionnaire and record to the district board having jurisdiction. The district board shall thereupon consider the case and proceed to classify the registrant, notwithstanding the fact that no claim for deferred classification by or in respect of the registrant has been made."

Important Definitions

The question of the "necessity" of an occupation is fairly well covered by the "preference list" which has been issued by the War Industries Board, which is to guide, but not absolutely govern, the draft boards. The following definitions of the word "necessary" as related to industries as well as to the positions of a worker in an industry, contained in the regulations, are important:

The word "necessary" as applied to any industry or occupation or employment or agricultural enterprise within the meaning of these regulations shall be taken to import that the discontinuance, the serious interruption, or the materially reduced production thereof, or the discontinuance or serious interruption thereof will result in substantial material loss and detriment to the adequate and effective maintenance of the military establishment, or the effective operation of the military forces, or the maintenance of national interest during the emergency.

A particular industry, or occupation, or employment, or agricultural enterprise shall be found "necessary" only when it is shown that it is contributing substantially and materially to the maintenance of the military establishment, or the effective operation of the military forces, or the maintenance of national interest during the emergency; and in the case of a particular agricultural enterprise, that it is producing an appreciable amount of agricultural produce

over and above what is necessary for the maintenance of those living on the place.

The word "necessary" as applied to the relation of a registrant to an industry, or occupation, or employment, or agricultural enterprise within the meaning of any particular rule governing deferred classification in these regulations shall be taken to import:

1. That the registrant is actually and completely engaged in the industry, or occupation, or employment, or agricultural enterprise, in the capacity recited in any such rule and that he is competent and qualified in that capacity.

2. That the removal of the registrant would result in direct, substantial, material loss and detriment to the effectiveness of the industry, or occupation, or employment, or agricultural enterprise.

3. That the available supply of persons competent in the capacity recited in the rule is such that the registrant cannot be replaced in such capacity without direct, substantial, material loss and detriment to the adequate and effective operation of the industry, or occupation, or employment, or agricultural enterprise.

In applying this rule the board should consider generally:

1. The length of time the registrant has been engaged in such capacity, and especially whether the circumstances of his engagement are such as to convince the board that he is not now so engaged for the primary purpose of evading military service.

2. The nature of the claimant's study, training, or experience, and the extent and value of his qualifications for the capacity in which he is engaged.

3. The actual conditions which would result from his removal.

The following rules are to determine whether the registrant is to be put in class 1, 2, 3 or 4:

In class 1 shall be placed—

Any registrant not found to be engaged in a "necessary" industry, or occupation, or employment, or, if found to be so engaged, not found to be "necessary" to the effective operation thereof in a capacity recited in Rule XXIV, XXV, or XXVI.

In class 2 shall be placed—

Any registrant found to be engaged in a "necessary" industry, or occupation, or employment, and found to be "necessary" therein in the capacity of a laborer, worker, or employee, especially fitted for the work in which he is engaged.

In class 3 shall be placed—

Any registrant found to be engaged in a "necessary" industry, or occupation, or employment, and found to be "necessary" therein in the capacity of—

A highly specialized expert.

An assistant or associate manager of the industry, or in the occupation, or employment, or a manager of a substantial integral part thereof.

In class 4 shall be placed—

Any registrant found to be engaged in a "necessary" industry, or occupation, or employment, and found to be "necessary" therein in the capacity of sole managing, controlling, and directing head thereof.

is now being utilized. Moreover, the production of basic open-hearth steel in Great Britain is continually on the increase.

The advantages of clean coal, or in other words, the effect of high ash on thermal efficiency, the amount of boiler plant required and the amount of transportation equipment involved, were recently investigated by the J. G. White Engineering Corporation, New York, for the National Research Council. The results of the investigation are obtainable in pamphlet form from the White company, which is located at 43 Exchange Place, New York. The report is a strong argument for the elimination of slate and other ash-forming impurities in coal before delivery to the railroad cars. Besides effecting economies in coal consumption and avoiding the necessity of extension of boiler plant capacity, the elimination of high ash coal would, it is figured, save about 5,000,000 tons of unnecessary freight per annum.

Japan manufactured in her own mills 529,614 tons of steel shapes during the past fiscal year, but to supply the demand for her ship-building interests she had to import 977,618 net tons from overseas. Japan's own mines yielded 370,110 tons of iron ore, but she secured 296,881 tons from China and other countries to keep steel mills of Japan in full operation. Of native production, 140,653 net tons came from Korea.

Use of British Basic Open-Hearth Slag

The experience of the British in using basic open-hearth slag for fertilizing purposes is discussed by Professors Gilchrist and Louis in the *Journal of the Society of Chemical Industry*. They point out that the neglect of this by-product of steel manufacture was due mainly to the circumstance that the availability of the phosphoric acid content was very low as compared with that of the basic slag obtained by the basic Bessemer process, when both were determined by the citric acid solubility test, and that this test was a purely empirical and arbitrary one, having no direct relation to field conditions. A year ago the total production of ground basic slag, available for agriculture, was estimated at 400,000 tons for the period April, 1917, to April, 1918. The actual quantity produced was about 25 per cent in excess of this. The increase was due to pressure exercised by the Minister of Munitions with the object of augmenting the quantity of low-grade slag which was being ground. In view of the enormous estimated annual production of open-hearth slag, 750,000 tons or more, the above increase may not appear to be very great, but it must be borne in mind that much of it is of far too low a grade to bear the costs of handling, milling and transportation, especially at the present time. Seven per cent total phosphoric acid is now regarded as the minimum payable grade, but in point of fact no slag containing less than 8 per cent

CUTTING DOWN STEEL USES

Stocks May Be Commandeered—Plans for Conservation by Consumers

WASHINGTON, Sept. 10.—The meeting of the members of the American Iron and Steel Institute with the Price Fixing Committee of the War Industries Board, Sept. 18, promises to be one of the most important of the year. By that time the Government officials hope to have completed their final figures on the steel requirements for the current six months. There seems to be little hope, however, that the present revision of the figures, which have gradually crawled up from 20,000,000 to 25,000,000 tons, can be kept below the latter figure.

The result is that a retrenchment program is to come out of the meeting which will cut every use of steel to the lowest notch. It is also expected that at that time the War Industries Board will prepare to commandeer such surplus stocks of steel as it may be able to discover throughout the country. This is the real purpose of the present inventory of steel stocks for which 40,000 questionnaires have been sent to as many manufacturers by the Census Bureau.

It is explained at the War Industries Board that there will be no commandeering of surplus stocks except where this is necessary. The necessity, however, is growing so rapidly that this reservation means little. The War Industries Board says it has no objection to the use of surplus steel for civilian purposes where such a surplus really exists, but the existence of the surplus is doubtful. There is one point, however, which is emphasized. That is that manufacturers who do not schedule their complete steel stocks will be dealt with ruthlessly when such concealment is discovered. The members of the steel section of the board, however, declare that they believe there will be little concealment and that the patriotism of the manufacturers, generally, can be depended on to make a full return of their iron and steel supplies.

The same meeting will consider iron and steel prices for the quarter following Oct. 1. So far there has been no indication as to these prices, but there is no question of the pressure that is being brought to bear in some quarters for increases. The work of the War Labor Board in raising wages generally is largely responsible for these demands.

Conservation in Stoves and Ranges

The retrenchment program of the War Industries Board continues unchecked. Representatives of the various iron and steel consuming industries are still being called in by the Conservation Division to be

given lessons and directions in economy. After several weeks of such conferences an agreement has been reached with the manufacturers of stoves and ranges, including gas, which is to result in a decided decrease in their output. The following war conservation program was agreed upon:

1. Each manufacturer is to reduce his assortment of sizes and styles of goods manufactured approximately 75 per cent.
2. The immediate discontinuance of the manufacture or the acquiring of new patterns for the duration of the war.
3. All cooking stoves or ranges manufactured to be equipped with No. 8 covers only, except where the body of the stove and range is too small to permit the use of such size.
4. The manufacture of back guards and tea shelves for steel high closets to be discontinued.
5. The manufacture of tin linings in ovens and doors to be discontinued.
6. Light patterns of stoves and ranges to be manufactured in preference to heavy patterns.
7. The manufacture of steel high shelves and canopies on domestic ranges to be discontinued.

War Service Committees by Industries

Meanwhile the Chamber of Commerce of the United States is continuing its organization of war service committees for the various industries. A meeting for that purpose will be held here to-morrow at the headquarters of the Chamber of Commerce of representatives of the chemical fire extinguisher industry. The manufacturers of safes and vaults are to meet here on Friday, the elevator manufacturers on Sept. 17, the road machinery manufacturers on Sept. 19, and the manufacturers of snap fasteners on Sept. 20. A meeting of the furniture manufacturers of the country will be held in Cincinnati on Sept. 17 to organize a similar committee. The officials of the Chamber of Commerce announce that they are ready to receive suggestions from all other industries that might be interested in forming such committees and to help them in their organization.

International Tin Pool

The organization of an international tin pool is under way. According to the present program, the pool will be in the hands of a committee which will determine the needs of the various Allied countries, and then allot the purchases. The actual purchases, however, will be made by the countries themselves, so as to maintain the direct touch between the seller and purchaser, instead of having an international committee take the place of the latter. One result of the formation of the pool is reported to be the discovery of considerable quantities of tin and tin plate in various of the Allied countries, apparently held back in the expectation of higher prices. The formation of the pool would end such speculation, and the result has been to put considerable of these stocks on the market.

Control of Pig Iron and Ferroalloys in France

By a decree recently issued by the French Minister of Armaments and War Products, the whole of the pig iron and some of the ferroalloys produced in France or imported into the country are to be controlled and distributed to consumers by the state. The ferroalloys to be controlled will include: Spiegeleisen with 4 to 10 per cent manganese, the same with 10 to 22 per cent manganese, "transition" ferromanganese and normal ferromanganese with about 80 per cent manganese. The ferrosilicons manufactured in the blast furnace and all ferroalloys produced in the electric furnace are not to come under official control at present.

Breweries Available for Other Industries

ST. LOUIS, Sept. 10.—More than 10,000 workmen and approximately \$100,000,000 worth of property will be made available for other industries in St. Louis on Dec. 1 next, when the breweries of the country by order of the Food Administration close their plants. The order from Washington forbidding the manufacture of beer after Dec. 1 was followed by rumors that many of the breweries of St. Louis would be converted into munition plants. Some of them, the Anheuser-Busch plant in particular, are adaptable to such purposes.

The Busch plant, the largest of its kind in the world, manufactures besides beer almost everything needed in the industry. This plant includes an extensive glass factory, foundries, wagon shops and even its private railroad system and coal mines.

Following relining and repairs, the Central Iron & Coal Co. has blown in its blast furnace at Holt, Ala.

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Business After War

The fact that collective buying will be practiced in the French industrial reconstruction after the war is stated clearly in the report just made to the Department of Commerce by a commercial attaché of the American Embassy in Paris, and reviewed at considerable length in THE IRON AGE last week. It is recognized in France that individual buying for industrial reconstruction is inadmissible. An incomplete list of damage to industries in the occupied portion of France shows an original cost of construction of more than a billion dollars. To the French authorities competitive buying appeared clearly to be out of the question. Collective buying and competitive selling represent as bad an alignment for the sellers as collective selling and competitive buying do for the buyers.

Much of the buying in this connection will be done in the United States. It is only one illustration of what the United States will be called upon to do. Events are likely to move rapidly in Russia—they certainly have moved fast in various directions there in the past 20 months—and in all probability Russia will present a very large commercial problem. Then there are the colonies of the various belligerents which for reasons it is quite unnecessary to detail will take on a new lease of life and be eager to develop themselves. Finally there are neutrals and non-belligerents which for five years or more will have been starved of the goods they have been accustomed to buy.

Thus there will be a tremendous buying demand, and there will also be a tremendous selling demand. The ordinary principles of commerce take care of business when commerce is a continuous performance. The business man, whether buyer or seller, takes note of the market, whether it is rising or falling, and adjustments occur accordingly in policies as to sales and purchases. There are trends, by continued gradations, from one condition to another. The war has stopped commerce and there is no basis from which trends can occur. Commerce cannot be left to re-establish itself. Definite plans must be made for restoring commerce on an equitable and safe basis. The matter cannot be left to itself. The auction sale of ordinary times furnishes an illustration of the principle. Steel billets or shares of listed stock companies are sold in an open market, established from day to day

by trends from the previously existing market; but when it is necessary to sell material for which no market price has been recognized, or the shares or property of a concern which has not had a definite market value assigned it, the auction is the usual resort. The auction is needed because there is no clear-cut market. So, after the war, there will be no clear-cut market values and values will have to be established.

Machinery, artificial machinery, so to speak, will have to be set up as an efficient means of getting business started again along safe lines and lines mutually advantageous to buyer and seller. The problem, however, is a much broader one than that of merely establishing purchase and sale prices. All will desire that the condition of the world be improved as rapidly as possible, and such an end will not be served if business is left to the mere basis that the lowest offer will make the first seller and the highest bid the first buyer. The first machine tool that is sold will not necessarily render the greatest service to the world if it is sold to the highest bidder. The first tool ought to go where it will do the most good. The council of nations that dictates the peace terms, or the League of Nations, if there is one, should have something to say as to the distribution of material and equipment first available, to place it where it will do the most good for the world's reconstruction.

There should be means for determining on a rational and efficient basis what should be bought and sold, by and to whom, and at what price. This war has come to be recognized as the supreme test of efficiency, and efficiency in reconstruction will be as loudly called for, not simply reconstruction in the narrow sense of restoring destroyed property, but of reconstructing the world's commerce, determining the things factories shall produce, where ships shall sail, what goods they shall carry, who shall have and use the goods, and the prices that shall be paid. This long prevalent idea of a "war after the war" has done much harm. It should be the common desire to avert such a war. The respective governments, as governments, are vitally interested. By reason of the tremendous amount of indebtedness, they are interested not only in the continued prosperity of their own peoples but of all other peoples.

To the regulation of commerce after the war much machinery in the United States is capable of

adaptation. There is the Shipping Board, whose basic duty defined in the law establishing it, to regulate shipping rates, has been largely forgotten. There is the Chamber of Commerce of the United States, one of Mr. Taft's valuable creations, capable of reflecting promptly and accurately the views of American business men. Then there is the great and intricate purchasing machinery of the War Industries Board, certainly capable of preservation in part and promising of much useful work.

Engineering Societies Show New Spirit

A spirit of introspection is apparently seizing the engineering societies. The idea has gradually become formulated that they are not on the whole serving their members well. A plea made to some of them a few years ago that through their associations engineers should take an active part in public affairs involving engineering reached a receptive audience, as the cumulative developments of recent months are showing. Repeatedly the engineer has complained that he does not receive proper public recognition. He has failed to appreciate that until he has done something for the public he can hardly expect the recognition. Accordingly it is through general engineering meetings discussing the technical phases of the public problem that engineering as a profession will mean more to the average man. No one help in this direction has been so great as the admittedly essential contribution of the engineer in the present war.

Steps are now being taken to accelerate the upward climb of the engineer to prominence. More and more does the local group of an association come to be regarded as the vital unit, the national organization remaining largely a co-ordinating whole. Local branches of the different societies not only afford the opportunity for bringing their own communities to the best solution of a water works, transportation or other local engineering problem, but a secondary movement looking to the cohesion of the local groups of different societies opens the way for establishing widely the profound impression desired. Carried to a logical outcome, these broad local groups are likely to bring about the establishment of a single, strong engineering association in each center with a national grouping finally in one general engineering society. There are increasing numbers who would welcome such a development.

That there is a call for a serious consideration of the aims of engineering societies and that possibly a restatement of their objects in broader terms is desirable is disclosed in the committee investigations now under way within three of the large national societies, those of the civil, mechanical and mining engineers. More will be heard of these through the winter when the committees have had opportunities to meet and formulate reports and to institute discussions at annual gatherings. Meanwhile, the regional distribution of members has been recognized in an unusual way by the American Society of Mechanical Engineers, which has called a meeting in Indianapolis in October, not merely of the Indianapolis section of the

society but of sections that are a night's ride distant.

It is not forgotten, of course, that through representation on the Engineering Council the national societies have a mouthpiece on national engineering matters, nor that the Engineering Foundation, with funds available for research work, will serve to strengthen the position of the engineer in society. Few of the influences now at work are adverse, though it is difficult not to class among these the publication of society journals in which there is evidence of stress in the search for advertising matter, with the inclusion in the reading pages of much that can hardly be regarded as having to do with association activities or strictly scientific progress, such as, for example, illustrated descriptions of devices made by advertisers in the society journals.

The present is a long way from the establishment of a general engineering society. That is a consummation not to be easily attained; but it is certain that the present era of self-examination, whatever the influences which brought it about, will redound to the lasting benefit of the societies and of their members as individuals.

The Fourth Liberty Loan

The fourth Liberty loan campaign will not have and will not need the fascination of novelty to make it a success. Some people are always looking for new thrills and the very fact that the experience was new undoubtedly attracted many who were active in the first Liberty campaign, but as the second and third campaigns came on, the thrill seekers either gave way to others of higher motives or themselves became imbued with a new purpose, and each campaign became a more decided success than its predecessor. The staying qualities of the American people were put to the test and with highly satisfactory results. Now an even severer test is to be applied.

Following the floating of the other great loans, the people of this country will be asked to subscribe for a much larger amount at a time when war burdens are falling more heavily than at any previous time. The cost of living has steadily increased, with every prospect of the upward tendency continuing. Some kinds of business have been seriously curtailed and others paralyzed; taxes will soon be heavily increased. But the American people, as a whole, are cheerful and patriotic and when once aroused as they are to-day about this war they are not only willing but anxious to do their full duty.

While the thought of failing in the next loan or in any future loan cannot be entertained for one moment, nothing should be left undone to make the fourth loan a splendid success not only in the amount raised but also in the number of subscriptions. The increase during the war in the number of bondholders in the United States from a few hundred thousand to about twenty millions has been one of the most heartening events of the period, but the number should be increased by several million more in the three weeks of the next campaign, thereby not only raising more money but:

also adding to the direct personal interest which the new subscribers have in the country's welfare.

With confidence THE IRON AGE looks forward to the employers and employees in the iron trade making even a prouder record than in the preceding campaigns.

Ships and Ship Plates

Reverting to the fact mentioned in this department recently that 1,100,000 net tons of plates have left the plate mills to date beyond the tonnage that has actually entered into vessel hulls, a general review of the course of shipbuilding is illuminating and interesting as to the position occupied by plates.

Under the Emergency Fleet Corporation program 258 steel vessels of 1,631,306 tons deadweight had been delivered up to Aug. 15. The amount of plates thus represented may be estimated as under rather than over 500,000 tons. The tonnage of plates in hulls still on the ways, or launched and awaiting equipment so as to be delivered, cannot be estimated closely, but is not far from that same amount. With the 1,100,000 tons of plates shipped but not yet in shipways there is a total of something like 2,000,000 tons of plates that have been furnished, so that the shipments represent four times the vessel tonnage that has gotten into service. The sketch is necessarily a rough one, but it depicts with sufficient accuracy an interesting condition. The view from one angle is that the shipping situation has thus far scarcely felt the effect of the plate tonnage the mills have produced.

The vessel deliveries to the Shipping Board quoted above represent some plates, in requisitioned vessels, that were furnished by mills before the Fleet Corporation took hold, but the proportion is relatively small. By far the major portion of the 2,000,000 tons of plates has been delivered since the memorable announcement of General Goethals at the American Iron and Steel Institute's dinner in May, 1917, that leaders in the steel industry had guaranteed a supply of plates for shipbuilding when it had become apparent to General Goethals that the wooden ship program would not prove a success.

There are various stages at which the work of building steel ships may be measured. There is the flow of plates from the plate mills. Then there is the flow of steel hulls from the shipways into the water, in other words, the launchings, which are reported monthly, and finally there is the flow of completed ships into registry. One has a plain picture that these launchings have exceeded the completions and deliveries by a large margin, there being many hulls awaiting equipment, and that the shipment of plates has greatly exceeded the tonnage that has actually entered into hulls.

Necessarily the fact is recognized that wooden hulls the same as steel hulls require engines, boilers and other equipment. Fifteen months have elapsed and the bottle neck is not the plate mills but the supply of equipment for hulls. Ship launchings in July were 631,944 tons deadweight and completions were 235,025 tons deadweight.

It has been no small effort that the plate mills have made in the intervening 15 months. Wonderful tasks have been accomplished, but of that nothing need be said for nothing less is expected in these times. It is no more than fitting, however, that it should be observed that the steel industry has "made good" with its undertaking to furnish steel plates for shipbuilding. Whatever tonnage of hulls had been launched, wood or steel, equipment would have been the controlling factor in deliveries of vessels for service.

Many weeks ago Director General Schwab recognized, and frankly admitted, that the matter of equipment, particularly the case of engines and boilers, was a serious one. He testified to a Congressional committee that few if any more shipways were needed and expressed hope that the matter of fitting out of vessels after launching could in time be taken good care of. Whether or not the limiting factor in future will be equipment or some other item remains to be seen.

Nominally, at least, there are 400 shipways for steel hulls completed and in operation, with 61 under construction. There is no formula by which vessel tonnage expectations can be computed from the number of ways in operation and the rates at which hulls have thus far been launched. From the fragmentary information available the rate might lie almost anywhere between 500,000 and 2,500,000 tons deadweight per month. While the present rate of plate shipment for shipbuilding is about 50,000 tons a week, equal to something like 800,000 tons deadweight of steel ships per month, there is no assurance either that this rate will prove sufficient or quite insufficient to satisfy the shipways, and the plate mills must remain on the *qui vive*.

Steel Failures and Grain Growth

An interesting practical application of a highly theoretical metallurgical subject is given in the abstract on other pages of a paper before the Iron and Steel Institute in London on a cause of failures in boiler plates. It was only a short time ago that the question of grain growth was brought before certain American technical societies and for a while it attracted but little attention except among those interested in a theoretical way. Among such there have been decided differences of opinion as to the causes of grain growth. To others the subject seemed hazy and of little immediate working value. But it is now shown to have a practical phase of real importance.

Under the investigations of Howe, Ruder and Jeffries in this country recently, facts have been developed in connection with grain growth in steel and its alloys which promise valuable results. In THE IRON AGE, Feb. 28, 1918, the subject was discussed editorially with the statement that it has already been established that grain size is dependent on temperature, cooling and other conditions and that grain size and growth are important factors in static, dynamic and other properties. In some metals the larger the grain, the better the properties for certain purposes, while the opposite is true in most cases.

The laws of grain growth are now better known.

In the case under discussion the boiler plate, so far as chemical analysis and physical or static tests are concerned, showed excellent metal—a striking instance of the little dependence that can actually be put in many cases on these tests alone. It is a fact that under certain conditions low carbon steel, when mechanically manipulated and subjected to plastic deformation, undergoes a change in structure—the ferrite grains increase decidedly in size, with weakening of the metal. This change is discoverable only by the microscope. Unless precautions are taken to correct this structure, failure of the metal is likely. The behavior of the British boiler plate is a case in point. The structure of the steel plate had been so altered that the metal cracked, but the manipulation of the plate in bending had not been abnormal. Many failures of boilers, hitherto unexplained, may have been due to just such alteration of structure due to grain growth. The rigid inspection to which boiler plate is usually subjected will not discover such weakness. It may result, as grain growth phenomena are further studied, that certain steels, where so much is at stake as in boilers, may have to undergo the special normalizing heat treatment discussed in the paper to insure a dependable metal.

CANADA ASSUMES CONTROL

Dominion Government to Distribute Raw Materials to Iron and Steel Industry

TORONTO, ONT., Sept. 10.—A radical step has been taken by the Canadian Government to insure adequate production and proper distribution of iron and steel raw materials in the Dominion to meet war and industrial needs. An order-in-council has been passed empowering the War Trade Board to co-ordinate the manufacturing capacity of Canadian iron and steel plants and distribute orders among them according to the capacity of the individual factories to take care of the orders to the best national advantage.

Generally, the War Trade Board is authorized and instructed to see to it that the basic raw materials of manufacture in Canada, both for munitions and industrial purposes, are turned out to the greatest possible economic advantage, and with the best possible distribution of supplies of labor and materials.

The War Trade Board will exercise supervision over the iron and steel industry analogous to that exercised by the Railway War Board over the railroads of the country. Each company will still, of course, retain its corporate entity and look after its own financial arrangements and management as heretofore. But the flow of orders will be regulated by the War Trade Board so as to prevent congestion with any one particular company, and possibly also to secure a specialization on output of particular commodities by individual companies with a view to speeding up output and generally regulating supply and demand.

American Gear Manufacturers' Meeting

The semi-annual meeting of the American Gear Manufacturing Association will be held at the Onondaga Hotel, Syracuse, N. Y., Sept. 19, 20 and 21. A portion of the program has been announced as follows: "Priority," by Charles A. Otis, who is head of the readjustment of industry under the authority of the War Industries Board. "What is the Possibility of Women Becoming a Permanent Factor in the Gear Industry," by W. H. Diefendorf, New Process Gear Corporation. "Trade Acceptances," by C. E. Crofoot, Crofoot Gear Works, Cambridge, Mass. "The Outlook for the Steel Supply," by C. E. Stuart, secretary and treasurer Central Steel Co., Massillon, Ohio.

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New Price Booklet

The American Iron and Steel Institute has published a new edition of its booklet on maximum prices on iron and steel products as agreed upon by Government officials and committees of the institute, together with prices, extras, and differentials recommended by its Committee on Steel and Steel Products. This booklet comprises 180 pages. It is bound in paper cover, like that of last January, and sells at the same price, namely, 50c. per copy, \$5 per dozen and \$35 per 100, transportation prepaid.

THE IRON AGE has obtained, for the use of its readers, a supply of the booklet and will send one to any subscriber on receipt of the postage, which is 18c. for one copy or 30c. for two copies, first class postage; or, 3c. for one copy and 5c. for two copies, second class postage.

Priority Rules Pamphlet

THE IRON AGE is receiving many requests for copies of the pamphlet giving rules governing priority in production issued by the Priorities Division of the War Industries Board—circular No. 4, superseding all previous rules and regulations—with some supplementary matter on priorities. The pamphlet will be sent to any subscriber upon receipt of an envelope 4¼ x 11 in. with 6c. in stamps attached, which will cover postage for one or two copies. The postage on three copies is 9c.; four copies, 12c.; six copies, 18c.; seven copies, 21c.; eight or nine copies, 24c. and on 10 copies, 27c.

Minor Price Changes Are Announced*

Slight Modifications by the American Iron and Steel Institute in Steel Castings, Tin Plate and Wire Rope—Application as to Foreign Buyers

The following statement has been issued by E. H. Gary, chairman, Committee on Steel and Steel Products of the American Iron and Steel Institute:

New York, Sept. 12, 1918.

The Committee on Steel and Steel Products of the American Iron and Steel Institute has received from a sub-committee reports based on information received from representative manufacturers of various lines of steel and steel products, and from such reports and other data available, the committee has concluded that certain changes and modifications in the maximum prices, differentials, extras, etc., as heretofore recommended by the institute are fair and reasonable, and the committee recommends that revised maximum prices, differentials and extras be adopted to take effect immediately, as follows:

Steel Bands, Hoops and Strips

Under the headings of "Additional Extras" in the recommendation of May 21, 1918, cancel the following: "For special stamping quality steel.....50c. extra," and in place thereof, substitute the following: "For deep stamping or drawing quality steel.....25c. extra For extra deep stamping or drawing quality steel.50c. extra."

Steel Castings

Cancel the paragraph headed "Freight Allowance," including the heading, at the bottom of page 133 of the Institute pamphlet of August, 1918, and substitute therefor the following:

Deliveries

The foregoing schedules (page 124 to 133 inclusive) cover the castings named therein, in the rough, f.o.b. maker's works, with published rate of freight allowed to freight station of purchasers, other than railroads, located within base territory; and in case of purchases by railroads, with published rate of freight allowed to nearest point on line of such railroad within base territory. On all deliveries made outside of base territory freight is allowed to boundary line only, excess to be paid by purchaser.

Base territory is defined to be within a line drawn from Boston, Mass., through Schenectady, Rochester and Niagara Falls, N. Y.; Detroit, Duluth, Minn.; St. Louis, Cincinnati, Washington, Cape May, N. J., and all other Atlantic Ocean terminal points between Cape May and Boston.

Cancel Note 1 on page 134, and Note 1 on page 135 of the Institute pamphlet of August, 1918, and in place of each substitute the following:

"Note 1—For f.o.b. and delivery points see page 138."

Cancel the heading on page 136, reading:

"List Prices Delivered to Car and Locomotive Builders in Base Territory, Carload and Less Carload Shipments, for Estimating Purposes,"

and in place thereof substitute the following:

"List Prices to Car and Locomotive Builders for Estimating Purposes."

Cancel Note 1 on page 136, and in place thereof, substitute the following:

"Note 1—For f.o.b. and delivery points, see page 138."

Cancel paragraph on page 138 reading:

"Delivery f.o.b. car works of manufacturer with freight allowed at the carload rate to point on railroad line nearest manufacturer's coupler foundry, or to any car or locomotive building plant located north of the Ohio, east of the Mississippi and west of the Hudson rivers, including Bettendorf, Iowa, St. Louis and St. Charles, Mo., Huntington, W. Va., and Curtis Bay, Md.,"

and substitute therefor the following:

F.o.b. and Delivery Points

Side Frames, Bolsters and Couplers

The above named prices on side frames, bolsters and couplers are f.o.b. cars, maker's works, with freight allowed at carload rate as follows: In the case of purchase by railroads, to the nearest point on such railroad, located in the States of New York, Pennsylvania, New Jersey, Delaware, Maryland, Virginia, West Virginia, Kentucky, Ohio, Indiana, Illinois, Michigan (Southern Peninsula only) and the City of

*These corrections should be pasted on blank pages of the new booklet of the American Iron and Steel Institute.

St. Louis, Mo.; in the case of purchase by any car or locomotive builder, to the plant of purchaser, if located in either of the above mentioned states, or in St. Louis, Mo., or in St. Charles, Mo., or in Bettendorf, Iowa, and in the case of the materials being purchased for export, to any export point in the above mentioned states.

For deliveries in the United States and outside of the above mentioned territory, add to the prices shown above, freight at carload rate from Columbus, Ohio, to the nearest point on railroad, or to the plant of any car or locomotive builder, or to any export point, as the case may be, less 20c. per 100 lb. The resulting price will be the price f.o.b. cars, maker's works, for said delivery; from which price deduction will be allowed for freight at carload rate, to nearest point on railroad, or to plant of car or locomotive builder, or to point of export, as the case may be.

Tin Plate

Change the extra for "tin lined cases" on page 85 of the institute pamphlet of August, 1918, from 30c. base to 40c. base, and make the "minimum charge in any case" 40c. per package instead of 30c. per package.

Change the extras for "enameling stock" and "full finished black plate" on page 86 of the institute pamphlet of August, 1918, from 25c. per 100 lb. to 40c. per 100 lb.

Wire Rope

Cancel pages 102 to 108 inclusive of the Institute pamphlet of August, 1918, and substitute therefor the following:

WIRE ROPE

Discounts or additions applying to standard lists in various territories (as stated below), recommended by the Committee on Steel and Steel Products of the American Iron and Steel Institute, September 10, 1918, to be effective on and after August 23, 1918.

STANDARD COMMERCIAL WIRE ROPE

EASTERN TERRITORY

Territory east of the western line of Missouri, Minnesota, Iowa, Arkansas and Louisiana and including points on either bank of the Missouri River between Sioux City and Kansas City, Mo.

Any point on West Side—not actually on the bank of River—shall be considered to be in Western Territory.

Grade	Consumer	Dealer	Agents and U. S. Gov't.
Bright plough steel.....	30%	30-21½%	30-10-5%
Bright extra strong.....	25%	25-21½%	25-10-5%
Bright cast steel.....	17½%	17½-21½%	17½-10-5%
Bright iron and iron tiller.....	List	21½%	10-5%
(For above ropes when furnished galvanized add 10% to list, and apply discount 7½ points less than for Bright Rope.)			
Galvanized iron rigging and guy rope.....	Plus 17½%	Plus 15%	List
Galvanized 6x37 hawsers.....	Plus 17½%	Plus 15%	List
Galvanized cast steel rigging and guy rope.....	21½%	21½-21½%	21½-10-5%
Galvanized 6x24 mooring lines.....	21½%	21½-21½%	21½-10-5%
Galvanized 6x12 hawsers.....	21½%	21½-21½%	21½-10-5%
Galvanized 6x12 running ropes.....	21½%	21½-21½%	21½-10-5%
Galvanized mast arm.....	21½%	21½-21½%	21½-10-5%

When ropes are made with wire center, add 10% to list price per foot.

DELIVERY

Freight allowed to railroad station nearest point of destination on all shipments weighing over 200 pounds; 200 pounds and under f.o.b. cars shipping point.

WESTERN TERRITORY

States of North Dakota, South Dakota, Nebraska, Kansas (excepting points on Missouri River between Sioux City and Kansas City), Texas, Oklahoma.

Grade	Consumer	Dealer	Agents and U. S. Gov't.
Bright plough steel.....	27½%	27½-21½%	27½-10-5%
Bright extra strong.....	22½%	22½-21½%	22½-10-5%
Bright cast steel.....	15%	15-21½%	15-10-5%
Bright iron and iron tiller.....	Plus 21½%	Plus 21½% less 21½%	Plus 21½% less 10-5%
(For above ropes when furnished galvanized add 10% to list, and apply discount 7½ points less than for Bright Rope.)			
Galvanized iron rigging and guy rope.....	Plus 20%	Plus 20% less 21½%	Plus 20% less 10-5%
Galvanized 6x37 hawsers.....	Plus 20%	Plus 20% less 21½%	Plus 20% less 10-5%
Galvanized cast steel rigging and guy rope.....	List	21½%	10-5%
Galvanized 6x24 mooring lines.....	List	21½%	10-5%
Galvanized 6x12 hawsers.....	List	21½%	10-5%
Galvanized 6x12 running ropes.....	List	21½%	10-5%
Galvanized mast arm.....	List	21½%	10-5%

When ropes are made with wire center add 10% to list price per foot.

DELIVERY

Freight allowed to railroad station nearest point of destination on all shipments weighing over 200 pounds; 200 pounds and under f.o.b. cars shipping point.

MONTANA, IDAHO AND UTAH

Grade	Consumer	Dealer	Agents and U. S. Gov't.
Bright plough steel.....	20 ⁰⁰ / ₁₀₀	20-21 ⁰⁰ / ₁₀₀	20-10-5 ⁰⁰ / ₁₀₀
Bright extra strong.....	15 ⁰⁰ / ₁₀₀	15-21 ⁰⁰ / ₁₀₀	15-10-5 ⁰⁰ / ₁₀₀
Bright cast steel.....	71 ⁰⁰ / ₁₀₀	71-21 ⁰⁰ / ₁₀₀	71-10-5 ⁰⁰ / ₁₀₀
Bright iron and iron tiller.....	Plus 10 ⁰⁰ / ₁₀₀	Plus 10 ⁰⁰ / ₁₀₀	Plus 10 ⁰⁰ / ₁₀₀
(For above ropes when furnished galvanized add 10% to list, and apply discount 7 1/2 points less than for Bright Rope.)			
Galvanized iron rigging and guy rope.....	Plus 27 1/2 ⁰⁰ / ₁₀₀	Plus 27 1/2 ⁰⁰ / ₁₀₀	Plus 27 1/2 ⁰⁰ / ₁₀₀
Galvanized 6x37 hawsers.....	Plus 27 1/2 ⁰⁰ / ₁₀₀	Plus 27 1/2 ⁰⁰ / ₁₀₀	Plus 27 1/2 ⁰⁰ / ₁₀₀
Galvanized cast steel rigging and guy rope.....	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀
Galvanized 6x24 mooring lines.....	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀
Galvanized 6x12 hawsers.....	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀
Galvanized 6x12 running ropes.....	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀
Galvanized mast arm.....	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀

When ropes are made with wire center add 10% to list price per foot.

DELIVERY

Delivery on shipments weighing over 200 pounds as below:
 Montana—Freight allowed to Butte only.
 Idaho—Freight allowed to Salt Lake City or Spokane.
 Utah—Freight allowed to Salt Lake City.
 200 pounds and under f.o.b. cars shipping point.

WYOMING, NEW MEXICO AND COLORADO TERRITORY

Grade	Consumer	Dealer	Agents and U. S. Gov't.
Bright plough steel.....	25 ⁰⁰ / ₁₀₀	25-21 ⁰⁰ / ₁₀₀	25-10-5 ⁰⁰ / ₁₀₀
Bright extra strong.....	30 ⁰⁰ / ₁₀₀	30-21 ⁰⁰ / ₁₀₀	30-10-5 ⁰⁰ / ₁₀₀
Bright cast steel.....	121 ⁰⁰ / ₁₀₀	121-21 ⁰⁰ / ₁₀₀	121-10-5 ⁰⁰ / ₁₀₀
Bright iron and iron tiller.....	Plus 5 ⁰⁰ / ₁₀₀	Plus 5 ⁰⁰ / ₁₀₀	Plus 5 ⁰⁰ / ₁₀₀
(For above ropes when furnished galvanized, add 10% to list, and apply discount 7 1/2 points less than for Bright Rope.)			
Galvanized iron rigging and guy rope.....	Plus 22 1/2 ⁰⁰ / ₁₀₀	Plus 22 1/2 ⁰⁰ / ₁₀₀	Plus 22 1/2 ⁰⁰ / ₁₀₀
Galvanized 6x37 hawsers.....	Plus 22 1/2 ⁰⁰ / ₁₀₀	Plus 22 1/2 ⁰⁰ / ₁₀₀	Plus 22 1/2 ⁰⁰ / ₁₀₀
Galvanized cast steel rigging and guy rope.....	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀
Galvanized 6x24 mooring lines.....	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀
Galvanized 6x12 hawsers.....	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀
Galvanized 6x12 running rope.....	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀
Galvanized mast arm.....	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀

When ropes are made with wire center add 10% to list price per foot.

DELIVERY

Delivery on shipments weighing over 200 pounds as below:
 Wyoming—Freight allowed to Cheyenne only.
 New Mexico—Freight allowed to Trinidad or to Colorado "common points" only.
 Colorado—Freight allowed to Denver and "common points" only.
 200 pounds and under f.o.b. cars shipping point.

Application of Maximum Prices

The committee calls particular attention of the steel industry to the following announcement under date of Aug. 29, 1918, of the War Industries Board, published in the Official Bulletin, issue of Aug. 30, 1918, and in THE IRON AGE of Sept. 5, page 569, defining the application of the maximum prices established by the United States Government.

"At a meeting of the price-fixing committee, held Aug. 27, the following resolution was passed:

"Be it resolved, that where prices are stated to be fixed for the United States Government, the government's associated with it in this war, and the public (or primary civilian sales), the said prices are hereby declared to extend to the Government and civilians of the United States (including civilians of its territories and insular possessions), and to the following governments, i. e., Great Britain, France, Italy, Belgium and Japan.

"And be it further resolved, that these maximum prices shall not extend to purchases made by the civilians of the latter mentioned allied nations nor to the governments or civilians of nations other than those above enumerated."

All prices, differentials and extras recommended by this committee have the same application.

The United States Railroad Administration has given authority to the Youngstown Sheet & Tube Co. to build five and one-half miles of railroad to connect its coal properties in Greene County, Pa., with the trunk line serving that territory. The regional railroad administrator has signed the contract for the building of the short road and work will start at once. The company expects to mine about 6000 tons of coal per day, all of which will be used in its Koppers by-product coke ovens at Youngstown.

CALIFORNIA, OREGON, NEVADA AND WASHINGTON TERRITORY

Grade	Consumer	Dealer	Agents and U. S. Gov't.
Bright plough steel.....	25 ⁰⁰ / ₁₀₀	25-21 ⁰⁰ / ₁₀₀	25-10-5 ⁰⁰ / ₁₀₀
Bright extra strong.....	30 ⁰⁰ / ₁₀₀	30-21 ⁰⁰ / ₁₀₀	30-10-5 ⁰⁰ / ₁₀₀
Bright cast steel.....	121 ⁰⁰ / ₁₀₀	121-21 ⁰⁰ / ₁₀₀	121-10-5 ⁰⁰ / ₁₀₀
Bright iron and iron tiller.....	Plus 5 ⁰⁰ / ₁₀₀	Plus 5 ⁰⁰ / ₁₀₀	Plus 5 ⁰⁰ / ₁₀₀
(For above ropes when furnished galvanized add 10% to list, and apply discount 7 1/2 points less than for Bright Rope.)			
Galvanized iron rigging and guy rope.....	Plus 22 1/2 ⁰⁰ / ₁₀₀	Plus 22 1/2 ⁰⁰ / ₁₀₀	Plus 22 1/2 ⁰⁰ / ₁₀₀
Galvanized 6x37 hawsers.....	Plus 22 1/2 ⁰⁰ / ₁₀₀	Plus 22 1/2 ⁰⁰ / ₁₀₀	Plus 22 1/2 ⁰⁰ / ₁₀₀
Galvanized cast steel rigging and guy rope.....	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀
Galvanized 6x24 mooring lines.....	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀
Galvanized 6x12 hawsers.....	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀
Galvanized 6x12 running rope.....	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀
Galvanized mast arm.....	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀	Plus 2 1/2 ⁰⁰ / ₁₀₀

When ropes are made with wire center add 10% to list price per foot.

DELIVERY

Delivery on shipments weighing over 200 lbs. as below:
 California, Oregon, Washington, Nevada. Delivery allowed to the following points:
 San Francisco, Los Angeles, Portland, Seattle, Tacoma, Port Blakely, Aberdeen, Hoquiam and Cosmopolis.
 If free delivery is made in Spokane, discount shall be 2 1/2% less.
 200 lbs. and under f.o.b. cars shipping point.

ARIZONA

Grade	Consumer	Dealer	Agents and U. S. Gov't.
Bright plough steel.....	20 ⁰⁰ / ₁₀₀	20-21 ⁰⁰ / ₁₀₀	20-10-5 ⁰⁰ / ₁₀₀
Bright extra strong.....	15 ⁰⁰ / ₁₀₀	15-21 ⁰⁰ / ₁₀₀	15-10-5 ⁰⁰ / ₁₀₀
Bright cast steel.....	71 ⁰⁰ / ₁₀₀	71-21 ⁰⁰ / ₁₀₀	71-10-5 ⁰⁰ / ₁₀₀
Bright iron and iron tiller.....	Plus 10 ⁰⁰ / ₁₀₀	Plus 10 ⁰⁰ / ₁₀₀	Plus 10 ⁰⁰ / ₁₀₀
(For above ropes when furnished galvanized add 10% to list, and apply discount 7 1/2 points less than for Bright Rope.)			
Galvanized iron rigging and guy rope.....	Plus 27 1/2 ⁰⁰ / ₁₀₀	Plus 27 1/2 ⁰⁰ / ₁₀₀	Plus 27 1/2 ⁰⁰ / ₁₀₀
Galvanized 6x37 hawsers.....	Plus 27 1/2 ⁰⁰ / ₁₀₀	Plus 27 1/2 ⁰⁰ / ₁₀₀	Plus 27 1/2 ⁰⁰ / ₁₀₀
Galvanized cast steel rigging and guy rope.....	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀
Galvanized 6x24 mooring lines.....	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀
Galvanized 6x12 hawsers.....	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀
Galvanized 6x12 running ropes.....	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀
Galvanized mast arm.....	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀	Plus 7 1/2 ⁰⁰ / ₁₀₀

When ropes are made with wire center, add 10% to list price per foot.

DELIVERY

Freight allowed to any railroad station on all shipments weighing over 200 pounds: 200 pounds and under f.o.b. cars shipping point.

Committee on After-War Conditions

President W. H. Finley of the American Association of Engineers announces the appointment of a committee of engineers to study after-the-war conditions. The committee consists of Isham Randolph, chairman; Edmund T. Perkins, consulting engineer, Chicago; Gardner S. Williams, consulting engineer, Ann Arbor, Mich., and Samuel Morell, Chicago, secretary. The committee will be increased as it gets into the work and will join forces with other agencies in Chicago and throughout the country that are now studying the problem. It plans to consider the returning soldier, in his rehabilitation if necessary, and his return to the industry which best suits his capacities and desires. It plans to study the better use of our natural resources in lands, minerals, waters and forests, to furnish opportunities for each citizen and the placing of industry, including agriculture, mining and transportation, on a basis to meet the changed needs of the country.

The estate of Frank H. Buhl, former iron and steel manufacturer of Sharon, Pa., who died some months ago, shows a total appraisement of \$5,606,754.26. After all deductions for taxes and other expenses, the estate amounts to about \$4,500,000. Under the terms of the will after bequests are made, the remainder of the estate goes to the city of Sharon. It will take some time to determine just what this amount will be. The bequests approximate \$4,100,000. The patriotism of Mr. Buhl is shown by the fact that he held Liberty loan bonds to the amount of \$1,000,000, and he bequeathed \$2,000,000 to war sufferers of France and Belgium.

Iron and Steel Markets

MANY ADVANCES ASKED

Price Adjustments More Complicated

Further Great Increase in War Requirements—Chicago Basing Comes Up Again

Preparations for the meeting at Washington next week to consider iron and steel prices for the last quarter of the year are occupying producers in a number of lines. This week preliminary meetings are being held in New York by several groups, notably by pig iron producers to-day (Wednesday). Later come iron ore interests and the class 3 steel makers—those who buy all their pig iron.

After their own meetings these groups will confer with the general steel committee and present their claims for advances. On Monday, Sept. 16, a full meeting of iron and steel manufacturers will be held in New York to formulate the position which the committee will take before the Price Fixing Committee at Washington, Sept. 18.

Advancing costs make the cases of those manufacturers who are pressing for advances stronger than at any other time this year. On the other hand the increasing absorption of steel by the Government adds to the reluctance of officials to put up prices.

Smaller producers are more outspoken in calling for a separation of their case from that of the integrated companies. Yet they are not ready to have the Government take over all output at differential prices. Neither Government nor steel trade wants to open that door.

There has been some surprise over information that the Lake Superior iron ore producers, whose prices were put up 45c. per ton in June, are now asking another advance. Their claim is that the 35c. increase in rail freight and the last 10 per cent added to wages have used up the June increment. Owners of some of the smaller underground mines in particular are urging their need of a higher price on next year's ore, to cover dead work which must be undertaken in the coming winter.

Galvanized sheet manufacturers will ask to have prices advanced at least enough to cover the higher prices they pay for spelter. Some wire and wire nail producers are urging claims for a higher price on those products.

Sentiment is divided between the view that the very number of the requests for higher prices will be convincing and the fear that the extent of the program puts much of it in jeopardy.

The vast scale of the plans for the offensive in France appears in weekly calls for more steel. The distribution of 34,000 tons of barb wire for the Government is just completed, with 22,000 tons for France in abeyance, when larger war demands for this product came up than have been considered

at any time thus far. In the Cleveland district, the placing of 10,000,000 additional shell forgings is one indication of the tremendous recent enlargement of the munitions program. The ordinary consumer's chance of getting steel, judged solely by the developments of the past week, will grow steadily less in the final quarter of the year.

Some letting down of demand may come in the structural field. Probably all the fabricated ship work for next year has been contracted for, and it is expected that all essential work will be let before 1919, with a total that will not keep the monthly volume of awards to the 60 to 65 per cent of capacity that has been the rule so far this year. The poor financial showings of the railroads may rule out much railroad bridge work that earlier was thought certain.

A number of fabricators of steel in the South, Middle West and Northwest are asking the Price Fixing Committee to restore the Chicago basing prices which prevailed for nine months and were abandoned July 1, leaving only the Pittsburgh base. It is not likely that the return to the trade practice of years will be disturbed again, especially as Pittsburgh mills are furnishing 200,000 tons of steel for the Pacific coast largely because of the filled-up condition of Chicago mills.

Consumers of tin are taking keen interest in the establishment of an Inter-Allied Tin Committee at London, on which two Americans are sitting, together with representatives of Great Britain, Holland, China and Japan. The purchase and distribution of tin among Allied countries by this committee are expected to result in a more stable market, presumably at still lower prices than have been reached in the recent decline.

The steel trade is reassured concerning the pending draft by increasing evidence that essential industries will be safeguarded. On the older men among those registering this week the greatest effect apparently will be in regulating industries so that the labor supply for those most essential will be increased.

Pittsburgh

PITTSBURGH, Sept. 10—(By Wire).

With Oct. 1 only three weeks away, the steel trade is mostly concerned now as to what action will be taken by the War Industries Board in regard to prices on pig iron, semi-finished steel, and finished steel products for the last quarter of this year. Agreeable to recent request of Judge Gary, the manufacturers of finished steel products have been put into units, each unit representing a special steel product, and any request to come before Judge Gary's committee from each unit for an advance in prices on its particular product will have to present a very strong case before a recommendation will be made to the War Industries Board by the committee for an advance in prices. Contrary

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Sept. 10 1918	Sept. 3 1918	Aug. 6 1918	Sept. 12 1917
No. 2 X, Philadelphia....	\$34.40	\$34.40	\$34.40	\$53.00
No. 2, Valley furnace....	33.00	33.00	33.00	52.00
No. 2, Southern, Cincinnati.	36.60	36.60	36.60	49.90
No. 2, Birmingham, Ala....	33.00	33.00	33.00	47.00
No. 2, Birmingham, Chicago*	33.00	33.00	33.00	55.00
No. 2, furnace, eastern Pa.	32.90	32.90	32.90	50.00
Basic, deliv., eastern Pa.	32.00	32.00	32.00	48.00
Basic, Valley furnace....	36.60	36.60	36.60	51.95
Bessemer, Pittsburgh....	33.50	33.50	33.50	55.00
Malleable Bess., Chicago*	33.50	33.50	33.50	52.00
Malleable, Valley	33.40	33.40	33.40	49.95
Gray forge, Pittsburgh....	37.85	37.85	37.85	58.00
L. S. charcoal, Chicago....				

Nails, Billets, Etc., Per Gross Ton:	Sept. 10 1918	Sept. 3 1918	Aug. 6 1918	Sept. 12 1917
Bess. rails, heavy, at mill..	55.00	55.00	55.00	38.00
O-h. rails, heavy, at mill..	57.00	57.00	57.00	40.00
Bess. billets, Pittsburgh...	47.50	47.50	47.50	75.00
O-h. billets, Pittsburgh...	47.50	47.50	47.50	75.00
O-h. sheet bars, P'gh....	51.00	51.00	51.00	80.00
Forging billets, base, P'gh.	60.00	60.00	60.00	100.00
O-h. billets, Philadelphia.	51.30	51.30	51.30	90.00
Wire rods, Pittsburgh....	57.00	57.00	57.00	90.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia....	3.73	3.73	3.73	5.185
Iron bars, Pittsburgh....	3.50	3.50	3.50	4.75
Iron bars, Chicago.....	3.50	3.50	3.50	4.50
Steel bars, Pittsburgh....	2.90	2.90	2.90	4.00
Steel bars, New York....	3.145	3.145	3.145	4.195
Tank plates, Pittsburgh...	3.25	3.25	3.25	8.00
Tank plates, New York...	3.495	3.495	3.495	8.945
Beams, etc., Pittsburgh...	3.00	3.00	3.00	4.00
Beams, etc., New York...	3.245	3.245	3.245	4.445
Ship, grooved steel, P'gh..	2.90	2.90	2.90	4.00
Ship, sheared steel, P'gh..	3.25	3.25	3.25	6.00
Steel hoops, Pittsburgh...	3.50	3.50	3.50	5.75

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Sept. 10 1918	Sept. 3 1918	Aug. 6 1918	Sept. 12 1917
Sheets, black, No. 28, P'gh.	5.00	5.00	5.00	8.50
Sheets, galv., No. 28, P'gh.	6.25	6.25	6.25	10.00
Wire nails, Pittsburgh....	3.50	3.50	3.50	4.00
Cut nails, Pittsburgh....	4.00	4.00	4.00	4.65
Fence wire, base, P'gh....	3.25	3.25	3.25	3.95
Barb wire, galv., P'gh....	4.35	4.35	4.35	4.85

Old Material, Per Gross Ton:

Carwheels, Chicago	\$29.00	\$29.00	\$29.00	\$33.50
Carwheels, Philadelphia...	29.00	29.00	29.00	34.00
Heavy steel scrap, P'gh....	29.00	29.00	29.00	34.00
Heavy steel scrap, Phila...	29.00	29.00	29.00	31.00
Heavy steel scrap, Ch'go...	29.00	29.00	29.00	33.00
No. 1 cast, Pittsburgh....	29.00	29.00	29.00	30.00
No. 1 cast, Philadelphia...	29.00	29.00	29.00	32.00
No. 1 cast, Ch'go, net ton.	30.00	30.00	28.25	24.00
No. 1 RR. wrot., Phila...	34.00	34.00	34.00	45.00
No. 1 RR. wrot., Ch'go, net.	29.75	29.75	29.75	36.00

Coke, Connellsville,

Per Net Ton at Oven:

Furnace coke, prompt....	\$6.00	\$6.00	\$6.00	\$13.50
Furnace coke, future....	6.00	6.00	6.00	10.00
Foundry coke, prompt....	7.00	7.00	7.00	14.50
Foundry coke, future....	7.00	7.00	7.00	12.50

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	26.00	26.00	26.00	25.50
Electrolytic copper, N. Y.	26.00	26.00	26.00	25.50
Spelter, St. Louis.....	9.25	9.12½	8.10	8.00
Spelter, New York.....	9.50	9.37½	8.40	8.25
Lead, St. Louis.....	7.75	7.75	7.75	10.12½
Lead, New York.....	8.05	8.05	8.05	10.25
Tin, New York.....	83.00	83.00	94.00	61.37½
Antimony (Asiatic), N. Y.	14.00	14.12½	13.00	14.50
Tin plate, 100-lb. box, P'gh.	\$7.75	\$7.75	\$7.75	\$12.00

In general belief, the ore producers will likely ask for higher prices on ore for next year. The advance of 5c. per ton made some time ago, the producers claim, was about all taken away from them in the advance of 35c. in freight rates and 10 per cent in labor, the latter amounting to 5c. or 6c. a ton. The pig iron producers, notably Northern and Southern merchant furnaces, are insistent that they must have higher prices for pig iron for last quarter, claiming that they are now operating at cost, or less. The makers of galvanized sheets, it is stated, will also ask for higher prices for their product, basing this on a higher market for galvanized. Of course nothing definite is known as to what action the War Industries Board will take on prices next week when it meets Judge Gary's committee in Washington, but the belief here is pretty strong that advances in prices will be few, and it is possible none will be made. It is pointed out that the Government is buying direct a very large part of the finished steel made in various forms, and it is suggested that it will go very slow in putting the market up on itself. A meeting with Judge Gary's committee is to be held in New York next Monday, to be followed by a meeting of the committee and the War Industries Board in Washington Sept. 18.

The survey the Census Bureau is to make of the steel stocks all over the country, it is believed, will do a great deal of good and will inform the Government of just how much steel it may expect to get out of jobbers' stocks over the remainder of the year. It is said the survey will include stocks held by the producers, also by manufacturing consumers, and involves reports from upward of 40,000 concerns. This gives some idea of the comprehensive work to be undertaken. As far as Pittsburgh is concerned, it is practically on a 100 per cent war basis, and has been for some time. Several of the larger steel companies report that Government obligations on their books will take their entire output for periods ranging from four months up to a year. One leading steel company is advertising

in the trade papers that 100 per cent of its products is going to the Government, and will do so for some months.

The local situation is very quiet, steel producers being entirely concerned with getting as close to 100 per cent production as they can, and shipping this as fast as possible. The latter situation is reported satisfactory, but the draft on Sept. 12 will no doubt make a big hole in the supply of labor, for as a result of it thousands of men employed in mills and factories may be called to training camps. In an effort to conserve power, elevator service and light have been cut off from Pittsburgh until 10 a. m. each day. It is claimed that from 10,000 to 12,000 kw. of electric power is saved each day under this ruling, all to be supplied to plants making war essentials.

Billets and Sheet Bars.—Output of soft steel billets and sheet bars is being further reduced by the heavier demands of the Government for shell steel, and the supply of bars for the sheet and tin plate mills is steadily getting less. The order to the tin plate mills to operate at not over 70 per cent of capacity in the last three months of this year may help out the sheet mills to some extent in getting them more bars. The only sales of semi-finished steel being made in this market are small lots of discard steel, which are snapped up as soon as offered, and bring very close to the Bessemer and open-hearth steel price. Output of Bessemer and open-hearth steel by Valley mills last week is reported to have been 85 per cent for the former and 90 per cent for the latter last week.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$47.50, and bars \$51, forging ingots \$73, and forging billets \$60 base, all f.o.b. at mill, Pittsburgh or Youngstown.

Pig Iron.—Merchant blast furnaces in the Valleys and elsewhere have gathered data to be submitted to the War Industries Board at Washington next week in their claim that they should have higher prices for their iron in last quarter and thereafter. Several independent producers of Bessemer iron claim they should

have an advance of \$2 per ton to let them out, and give them a fair profit. The United Engineering & Foundry Co. has an inquiry out for 1500 to 2000 tons of Bessemer iron for last quarter, but up to this time has not been allocated. There have been sales of 1500 to 2000 tons of Southern charcoal iron in this market at \$50 per ton at Southern furnace plus \$5 70 freight, making the price \$55.70 delivered here. All the large steel companies making pig iron would be glad to buy in the open market, but there is no iron to be had. Stocks in mill yards and at furnaces are pretty well cleaned up, and some of the larger steel companies report they never have more than two or three days' supply of iron ahead and sometimes less. We quote:

Basic pig iron, \$32; Bessemer, \$35 20; gray forge, \$32; No. 2 foundry, \$33; No. 3 foundry, \$32.50, and malleable \$33.50, all per gross ton at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh district being \$1.40 per ton.

Ferroalloys.—Several large consumers of ferromanganese in the Cleveland district are reported to have bought quite heavily recently to cover their needs over first half of next year. Local consumers are also pretty well covered for that period, and any new inquiry for ferroalloys of all kinds is quiet. One consumer has bought 300 tons of 70 per cent ferromanganese for first quarter at \$250 per gross ton, delivered, but declined to buy for second quarter in the belief that the war might be over by that time, and perhaps prices may be on a lower basis. A Wheeling, W. Va., consumer is said to have bought a round lot of 50 per cent ferrosilicon for first half of the year delivery at \$150 per gross ton, delivered.

We quote 70 per cent ferromanganese at \$250 delivered, 16 per cent spiegeleisen at \$75 at furnace and 50 per cent ferrosilicon for prompt shipment at \$160 and for delivery over the last half of the year, \$150 to \$155 at furnace, the furnaces usually absorbing the freight.

We quote 9 per cent Bessemer ferrosilicon at \$54; 10 per cent, \$55; 11 per cent, \$58.30; 12 per cent, \$61.60. We quote 6 per cent silvery iron, \$41; 7 per cent, \$43; 8 per cent, \$45.50; 9 per cent, \$47.50; 10 per cent, \$50. Three dollars per gross ton advance for each 1 per cent silicon for 11 per cent and over. All the above prices are f.o.b. maker's furnace, Jackson or New Straitsville, Ohio, these furnaces having a uniform freight rate of \$2.90 per gross ton, for delivery in the Pittsburgh district.

Plates.—Practically 100 per cent of the output of plates in the Pittsburgh district is being shipped on Government needs to the shipyards and the steel car companies. Three of the largest plate mills in this district report their entire output sold up on direct Government orders for at least six months, and one mill reports its present obligation would take its entire output over the next year. The steel car companies are heavy consumers, working on large Government orders for cars.

We quote sheared plates at 3.25c., at the mill, Pittsburgh, for third quarter.

Structural Material.—Only a very small amount of commercial work is being placed, practically all jobs being Government work. The McClintic-Marshall Co. has taken 250 tons for a new steel building for the MacBeth-Evans Co. and about 500 tons for Pier No. 15, Hudson River, New York. Local fabricators say they are filled up nearly entirely on Government work for six months or longer.

We quote beams and channels up to 15 in., at 3c. at mill, Pittsburgh, for third quarter.

Iron and Steel Bars.—There was so much discussion of the recent concession on agricultural bars that it seemed desirable to hold up the official announcement of it until later. Output of soft steel bars by local mills is now not over 50 per cent of normal, due to the heavy demand of the Government for shell steel. The demand for iron bars is quiet and several mills can take orders for fairly prompt delivery.

We quote soft-steel bars rolled from billets at 2.90c.; from old steel rails, 3c.; and refined iron bars at 3.50c. at mill, Pittsburgh, for third quarter.

Sheets.—The average of operations by the independent sheet mills in August was about 60 per cent, while the leading interest operated to only about 50 per cent. The Government has been a very heavy buyer of annealed and galvanized sheets recently, some heavy orders having been allocated to the mills this month. One order now in the market is for 500,000 meat pans for quick shipment, and these will require

a very large tonnage of sheets, which must be furnished promptly. Nearly all the sheets being bought for the Government are for shipment to France for Government work in that country. With Government orders and also commercial business on their books, sheet mills are sold up for all this year and have heavy orders for January delivery. No figures are available yet as to output of sheets in August, but it is known that it was less than in July. Owing to the higher prices of spelter, makers of galvanized sheets will ask the War Industries Board for an advance in prices for fourth quarter. When present prices of sheets were fixed by the Government, spelter was about 7c. and recently has sold at 8½c. to 9c. This has resulted in heavy increase in costs of making galvanized sheets. Prices of sheets for this quarter are given on page 661.

Tin Plate.—On Sept. 5 the War Industries Board issued an order to the effect that tin plate mills should operate at not above 70 per cent of capacity in the last three months of this year. This means a decrease in output for last quarter in tin plate of 20 to 25 per cent, the mills having been operating for some time at 90 to 95 per cent of capacity. The reason given for this action is the pressing need of steel for war essentials. The tin plate needed for containers for perishable food is practically assured, while non-perishable foods can be packed later. The supply of pig tin is good, and mills are receiving shipments as fast as needed. Foreign inquiries mills quote quite frequently, but when intending buyers apply to the Government for license for export shipment, they are usually turned down and export shipments have been light for some time.

Wire Products.—Allocations have been made for the 34,000 tons of 4-point black painted barbed wire for the United States War Department, one local mill taking 8000 tons and another 6000 tons. The 22,000 tons for France has not yet been allocated. Output of wire and wire nails is not more than 50 per cent of capacity at present, and one leading mill is operating at only 30 per cent. There is practically no wire or wire nail available for jobbers whose stocks are very light, and on the more common sizes of wire nails are about depleted. Prices on wire products to Sept. 30 are given on page 661.

Wire Rods.—Local makers say they have no rods to sell, and are not quoting on the few new inquiries coming up. Some small sales of high carbon rods are being made, where they are intended for Government work at \$80 to \$85 at mill, the price depending on the carbon content. Prices on wire rods for this quarter are given on page 661.

Cotton Ties.—The season is pretty well over, but one or two makers have reserved a small tonnage to sell in last quarter, and will dispose of this as soon as the price is fixed for that delivery. Cotton ties for September shipment are \$1.95 per bundle of 45 lb. f.o.b. Pittsburgh.

Shafting.—Present output of shafting is not more than 50 or 60 per cent of capacity and it will likely be less in the near future owing to the heavy demand of the Government for shell steel. The demand for the smaller sizes is dull, but for sizes 2¼ in. and larger is active, and on this makers are sold up for three or four months.

For third quarter we quote cold-rolled shafting at 15 per cent off list in carloads and 12 per cent in less than carloads f.o.b. Pittsburgh.

Rivets.—It is said the Government placed lately a contract for 15,000 tons or more of rivets for ship yards and which has been allocated to the different makers. The commercial demand is dull, the Government taking nearly 100 per cent of the output.

We quote butthead structural rivets at \$4.40, conehead boiler rivets at \$4.50 per 100 lb. Small rivets are 50 and 1 per cent off list for third quarter f.o.b. Pittsburgh.

Nuts and Bolts.—The demand from commercial users of nuts and bolts is heavy, but fully 95 per cent of the output is going to the Government on direct and indirect orders. Makers of nuts and bolts feel that present prices are too low, owing to higher costs of labor and other materials. Discounts for third quarter are given on page 661.

Hoops and Bands.—Makers report the demand for hoops for cooperage purposes as very active, the Government stimulating oil and resin products all it can. Present output of hoops and bands is not more than 50 per cent of capacity, and possibly less, owing to the shortage in supply of steel. We quote steel hoops and bands at 3.50c. per lb. base, f.o.b. Pittsburgh for third quarter.

Spikes.—The demand for small spikes is abnormally heavy, for coal mine trackage and other purposes, and the Government is urging the makers to turn out as large tonnage as possible. Makers of small spikes are sold ahead for some months, and will do all it can to increase output. The demand from jobbers is also active to replace stocks, but they are getting only a very small part of the spikes they want. The demand for standard spikes is very quiet.

Standard sizes of railroad spikes 9/16 x 4 1/2 in. and larger, \$1.90 per 100 lb. in lots of 200 kegs of 200 lb. each, or in larger lots. Boat spikes, \$5.25 per 100 lb., rack bolts, \$4.90 base in lots of 200 kegs or more; less than 200 keg lots, \$1 per 100 lb. extra. All f.o.b. Pittsburgh.

Hot-Rolled Strip Steel.—Makers report the demand active, this material being used largely in the manufacture of war essentials. Output is not more than 60 per cent owing to shortage in steel, and makers say they cannot increase this, but fear it may fall off still further.

We quote hot-rolled strip steel at \$3.50 per 100 lb., Pittsburgh, for third quarter, 50c. additional being charged per 100 lb. for special stamping quality.

Cold-Rolled Strip Steel.—The Government has not been a very heavy buyer for some time, and the demand from the commercial trade is also quiet. Present output of cold-rolled strip steel is not more than 50 per cent of capacity, and some makers are running at a less rate. We quote:

We quote cold-rolled strip steel at \$6.50 per 100 lb. f.o.b. Pittsburgh, terms 30 days, less 2 per cent for cash in 10 days when sold in quantities of 300 lb. or more. Freight is allowed to destination when it does not exceed 31c. per 100 lb.

Wrought Pipe.—Mills rolling iron and steel pipe do not expect that their output will be very much restricted by the heavy Government demand for shell steel, the production of tubular goods being regarded as among the war essentials. The Government has been a heavy buyer of wrought iron and steel pipe, and also of cast-iron pipe for the laying of water lines in France. The demand for lap-weld pipe for the laying of oil lines and other war purposes is heavy, and the Government is not likely to restrict its output. Mills are sold up on iron and steel pipe for four to six months, and the supply available for jobbers does not meet their needs. Under a recent ruling mills are allowed to ship to jobbers as much pipe in any one month as the jobber shipped out in the preceding month, but the mills have not been able to carry this out. Discounts on iron and steel pipe are given on page 661.

Coke.—Blast furnaces and foundries believe that from this time on they will get better coke than they have been receiving for some time owing to the fact that under Government direction it is proposed to inflict a fine of \$1 per ton on any producer who ships out either blast furnace or foundry coke that is not up to the required standard. Blast furnaces have been complaining for months of the poor quality of coke they have been receiving, stating that it was running up their consumption of coke from 100 to 200 lb. per ton of iron, and was also decreasing their output. The supply of cars is just about large enough to take care of the daily output of coke, but does not allow the furnaces to accumulate any stocks. Any free coke being offered is very quickly taken up. It is not believed there will be any changes in coke for fourth quarter. Output of coke in the upper and lower Connelville regions for the week ending Aug. 31 was 338,250 tons, an increase of only 545 tons over the previous week. Strong efforts are being made by the coke producers, in connection with the Fuel Administration, to increase the output of coke, but unless the coke workers agree to work more steadily than they have for a long time, it is doubtful whether the desired result can be obtained. Owing to the very high

wages being earned by coal miners and coke workers, many refuse to work more than four or five days a week and take advantage on every occasion to lay off.

We quote 48-hr. blast-furnace coke at \$6; 72-hr. foundry, \$7, and crushed coke over 3/4 in. at \$7.30, all in net tons of 2000 lb. at oven.

Old Material.—Present conditions in the local scrap trade are only fairly satisfactory. It is said the supply of scrap is getting less right along, it being simply impossible to find enough to meet the demands of the steel mills. Various schemes are being tried to increase the supply of scrap, even the American Red Cross having undertaken to gather all kinds of scrap material it can, while the mayor of Pittsburgh has asked the citizens to deposit any scrap they may be able to get in appointed localities where it would be available. It is stated some adjustments have been made on contracts for what was called "unguaranteed low phosphorus" and billed to the mills at \$34, but which in reality was only heavy steel scrap and should have been billed at \$29, plus the commission. There is a heavy demand for steel melting scrap, cast scrap, low phosphorus and borings and turnings. The embargo on borings and turnings is still on, and until Sept. 18 these can be sold only to steel works. We note sales of 5000 to 6000 tons of heavy steel scrap at \$28 delivered, upward of 10,000 tons of borings and turnings at \$19 delivered, 500 tons of low phosphorus scrap, bloom and billet ends at \$39 delivered, all with the 3 1/2 per cent commission.

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh delivered.....	\$29.00
No. 1 cast scrap (for steel plants).....	29.00
Re-rolling rails, Newark and Cambridge, Ohio, Cumberland, Md., Franklin, Pa., and Pittsburgh.....	34.00
Hydraulic compressed steel scrap.....	29.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh, district.....	\$27.50 to 29.00
Bundled sheet stamping scrap.....	22.00 to 23.00
No. 1 busheling scrap.....	28.00 to 29.00
Railroad grate bars.....	18.00 to 19.00
Low phosphorus melting stock (unguaranteed).....	34.00
Low phosphorus melting stock (guaranteed).....	36.50
Low phosphorus melting stock (bloom and billet ends heavy plates).....	39.00
Iron car axles.....	46.00 to 46.50
Locomotive axles, steel.....	46.00 to 46.50
Steel car axles.....	46.00 to 46.50
Railroad malleable (for malleable works).....	34.00
Machine shop turnings.....	19.00
Cast iron wheels.....	29.00
Rolled steel wheels.....	36.00
Sheet bar crop ends (at origin).....	35.00
Cast iron borings.....	19.00
No. 1 railroad wrought scrap.....	34.00
Heavy steel axle turnings.....	24.00
Heavy breakable cast scrap.....	28.00 to 29.00

British Steel Market

Scarcity of Foundry Iron—Blast Furnace Output Unsatisfactory

(By Cable)

LONDON, ENGLAND, Sept. 11

Foundry iron is scarce and more is required for export. Blast furnace output is still unsatisfactory and demands are excessive. Richard Thomas has purchased the Cwmfelin Steel & Tinplate Co. and the Redbourn Hill Iron & Coal Co. Current quotations on various products are as follows:

Tin plate, coke, 14 x 20; 112 sheets, 108 lb., f.o.b. Wales, 33s. 6d.	
Ferromanganese, \$260 to \$265, c.i.f. for export to America and Canada; £26 10s. for British consumption.	
On other products control prices per gross ton are:	
Hematite pig iron, East Coast, £6 2s. 6d.; West Coast, £6 7s. 6d.	
Cleveland pig iron (export), £5 5s. for No. 1 and £6 6s. for basic. Domestic prices, 6s. below these figures.	
Steel plates, ship, bridge and tank, £11 10s. to £17, according to size.	
S. M. boiler plates, basis, £12 10s.	
Bar iron, standard quality, basis £14 15s.; marked £17, net.	
Sheet and tin plate bars, £10 7s. 6d.	
Blooms and billets for re-rolling (ordinary), £10 7s. 6d.; special quality, £11.	
Wire rods, £21 10s. net, basis.	

Chicago

CHICAGO, Sept. 9—(By Wire.)

A memorial to the Price Fixing Committee of the War Industries Board asking that Chicago be re-established as a basing point for iron and steel is being circulated with a request that consumers and manufacturers append their signatures and send to L. R. Gifford, secretary Structural Steel Society, 521 Frisco Building, St. Louis. The petition is signed by Mr. Gifford and Robert L. Owens, president of the society and a number of fabricators in the South, Middle West and Northwest. It suggests that the ideal arrangements would be a single basing point, and that Chicago, because of its geographical location, its low costs and facilities for distribution, should be that one, but rather than create any undue disturbance it would consider dual basing points acceptable—Pittsburgh and Chicago. It cites several arguments, old and new, advocating Chicago as a base, says that Eastern manufacturers have been given an undue amount of war work and that the West asks only for simple justice. It asserts that "ceasing to recognize Chicago as a basing point for steel, and thereby increasing the price at Chicago and in the whole Western territory, is out of harmony with the announced policy of the Resources and Conversion Section of the War Industries Board." The memorial quotes Chairman Gary's recent speech at Duluth wherein he said the cost of producing steel at Gary was 88.88 per cent against 100 per cent at Pittsburgh, in substantiation of the low-cost-for-Chicago claim. The memorial also says:

"As a great example of what was possible when Chicago was used as a price basing point, we refer to the fact that a number of fabricators in the Mississippi Valley were able to make such prices on fabricated shipbuilding material for delivery on the Atlantic seaboard that they secured a large amount of this business on account of more favorable prices than could be obtained from Eastern fabricators, freight to destination considered."

Steel men say the matter of Chicago as a basing point is of but little importance at this time. When, a few months ago, Chicago was eliminated as a basing point, the action was regarded as equivalent to giving the mills here an advance in price, and they expressed themselves as satisfied.

The jobbers are now giving their orders to replace shipments made in August and with the orders they send certification that they are seeking to replace material delivered for essential use, also that they are asking each mill for its proper proportion of what they want. The orders coming under a B-4 classification, there is no certainty as to time of delivery.

All mill managers are regarding the new draft with anxiety and hope for no break in the chain of labor necessary for production. Many men not actually steel makers are essential to the unbroken operation of a mill. The tin mill of one local company is down because it has no crew.

The interest in the iron market is centered in what will be done with fourth quarter prices. A bar iron maker has made large shipments to Eastern chain makers, Eastern mills apparently being full. Old material is scarcer than ever.

Pig Iron.—Interest in pig iron is largely confined to speculation as to what changes, if any, will be made in prices for the fourth quarter, in consideration of which a meeting is to be held in New York this week. Sales and distribution have resolved themselves into cut and dried affairs. One Northern interest continues to place contracts with manufacturers of essentials for delivery in the first half of 1919; others are not selling at all except where they dispose of a little high-sulphur iron. If this iron is not too far from standard specifications, it is readily taken, although the appetite for it is not as keen as formerly. In regard to prices, Northern producers, as a rule, are not doing much complaining, it being the Virginia and Tennessee furnaces which are not satisfied. It is suggested that basing points might be established in a way to give these stacks the benefit of freight rates that would amount to an ad-

vance in price. At best, the matter is one of pure speculation at this time.

The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable, steel-making irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5.....	\$39.00
Lake Superior charcoal, No. 6 and	
Scotch	\$39.50 to 41.00
Northern coke foundry No. 1.....	33.50
Northern coke foundry, No. 2.....	33.00
Northern coke foundry, No. 3.....	32.50
Northern high-phosphorus foundry.....	33.00
Southern coke No. 1 foundry and No. 1 soft.....	39.50
Southern coke, No. 2 foundry.....	38.00
Malleable	33.50
Basic	32.00
Low phosphorus (copper free).....	52.00
Silvery, 7 per cent.....	46.20

Ferroalloys.—Standard ferromanganese has been more active although no large tonnages are under inquiry. Sales have been confined to the domestic product. It is not likely that the embargo on imports will be further relaxed this year, as was done a few months ago, to admit 12,000 tons of British ferromanganese. Bessemer ferrosilicon is quiet again.

We quote 70 per cent ferromanganese at \$250, delivered; 50 per cent ferrosilicon at \$150 to \$160, delivered, and 16 to 18 per cent spiegeleisen at \$75, furnace.

Sheets.—Production is cut down to an alarming degree by the shortage of steel, one local producer now operating at less than 50 per cent, and this at a time when it easily could dispose of its entire production at capacity. The Government needs and is taking the heavier gages. For mill prices see finished iron and steel f.o.b. Pittsburgh, page 661. Jobbers quote:

Chicago delivery out of stock regardless of quantity, No. 10 blue annealed, 5.52c.; No. 28 black, 6.52c., and No. 28 galvanized, 7.77c.

Bolts and Nuts.—No consumers can close contracts save where they can show they are engaged in Government work. Without this assurance the bolt makers cannot secure raw material wherewith to fill orders. For mill prices see finished iron and steel f.o.b. Pittsburgh, page 661. Jobbers quote:

Structural rivets, 5.67c.; boiler rivets, 5.77c.; machine bolts up to ¾ x 4 in., 37½ per cent off; larger sizes 25 and 6 off; carriage bolts up to ¾ x 6 in., 32½ off; larger sizes, 20 off; box pressed nuts, square, tapped, \$1.05 off; hexagon tapped, 85c. per 100 lb.; coach or lag screws, gimlet points, square heads, 40 per cent off.

Wire Products.—The makers are contending with great Government demands and a curtailed steel supply. They could dispose of much more than they are making. For prices see finished iron and steel f.o.b. Pittsburgh, page 661.

Rails and Track Supplies.—The leading producer intensifies on rails or shell steel as the Government directs and its production of standard section rails is therefore uncertain. Light rails are in heavy demand, especially for export to Japan and France. In the latter country they are used for trench supports as well as for trench railroads. We quote:

Standard railroad spikes, 3.90c., Pittsburgh. Track bolts, with square nuts, 4.90c., Pittsburgh. Tie plates, steel, 2.25c.; tie plates, iron, 3.75c.; f.o.b. maker's mill. The base for light rails is 3c., f.o.b. maker's mill, for 25 to 45-lb. sections, lighter sections taking Government extras.

Plates.—The mills are swamped with Government demand, and all that is available for outside consumers are a few carloads each week of rejected plates thrown out by inspectors because of blisters or other defects.

The official mill quotation is 3.25c., Pittsburgh, the freight to Chicago being 27c. per 100 lb. Jobbers who have stock quote 4.52c.

Structural Material.—Non-Governmental needs are occasionally satisfied with rejected material, otherwise, as in plates, the Government is absorbing production. The Austin Co., Cleveland, Ohio, will fabricate 1473 tons required for a shell shop to be built for the Laclede Gas Light Co., St. Louis. The Stupp Brothers Bridge & Iron Co. will supply a crane runway requiring 450 tons for the American Car & Foundry Co., St. Louis.

The official mill quotation is 3c., Pittsburgh, which takes a freight rate of 27c. per 100 lb. for Chicago delivery. Jobbers quote 4.27c. for material out of warehouse.

Bars.—The stringency in mild steel bars is unabated. Bar iron shows a considerable betterment, an active demand coming from regular consumers, while a considerable tonnage of chain iron has been shipped to Eastern

points, indicating that Eastern mills are filled. The chain is for the Emergency Fleet Corporation. Bar iron has also been shipped to the Orient and a little to South America. The mills generally are on a better productive basis despite an inadequate labor supply. Mills rolling high carbon bars run alternately on old rails and discard shell steel. A local maker has established a base price of 3.25c., Chicago, for discard bars, with extras for sizes, and asks the same price minus extras for angles.

We quote, mill prices, mild steel bars at 2.90c., Pittsburgh, taking a freight rate to Chicago of 27c. per 100 lb. Bar iron is quoted at 3.50c., Chicago, and rail carbon at 3c., Chicago, a leading maker having adhered to Chicago as the basing point. Jobbers' prices follow:

Soft steel bars, 4.17c.; bar iron, 4.17c.; reinforcing bars, 4.17c. base. No extra charge for twisting $\frac{3}{4}$ -in. and over; $\frac{1}{2}$ -in. for twisting $\frac{3}{8}$, 11/16, $\frac{1}{2}$ and 9/16; 5c. for 7/16 and $\frac{3}{4}$; 10c. for 5/16 and 15c. per $\frac{1}{4}$ -in. Extras as per card are charged for small sizes. Shafting, list plus 13 per cent.

Cast-Iron Pipe.—Municipal business is practically at a standstill. Something may come in a few weeks from the authorization of Akron's bond issue for \$2,000,000 for water works improvements.

We quote per net ton, f.o.b. Chicago, ex-war tax as follows: Water pipe, 4-in., \$64.80; 6-in. and larger, \$61.80. Class A and gas pipe, \$1 extra.

Old Material.—The fact that a few items which have been lagging are now working up to the allowable maximum prices is an indication of an improvement in the general demand. Almost every grade of scrap, heavy melting steel in particular, is active so far as material can be found to satisfy the demand, but the scarcity tends to become more acute. The Wabash, Pere Marquette, Great Northern and Northern Pacific have issued lists of average size for the times, this meaning that none is large.

We quote for delivery in buyers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Old iron rails.....	\$39.00
Relaying rails.....	\$55.00 to 60.00
Old carwheels.....	29.00
Old steel rails, rerolling.....	34.00
Old steel rails, less than 5 ft.....	34.00
Heavy melting steel.....	29.00
Frogs, switches and guards, cut apart.....	29.00
Shoveling steel.....	29.00
Heavy steel axle turnings.....	24.00

Per Net Ton

Iron angles and splice bars.....	\$34.82
Iron arch bars and transoms.....	41.52
Steel angle bars.....	30.36
Iron car axles.....	41.52
Steel car axles.....	41.52
No. 1 railroad wrought.....	\$29.75 to 30.36
No. 2 railroad wrought.....	28.75 to 29.46
Cut forge.....	28.75 to 29.46
Pipes and flues.....	24.50 to 25.00
No. 1 busheling.....	27.00 to 27.63
No. 2 busheling.....	18.50 to 19.00
Steel knuckles and couplers.....	30.36
Coil springs.....	30.36
No. 1 cast scrap.....	30.00 to 30.36
Boiler punchings.....	32.59
Locomotive tires, smooth.....	40.50 to 41.50
Machine-shop turnings.....	15.75 to 16.25
Cast borings.....	16.50 to 16.96
Stove plate and light cast scrap.....	25.50 to 25.89
Grate bars.....	25.50
Brake shoes.....	25.50
Railroad malleable.....	30.36
Agricultural malleable.....	29.00 to 30.00
Country mixed scrap.....	22.50 to 23.00

Philadelphia

PHILADELPHIA, Sept. 10

Production of steel in eastern Pennsylvania plants in August was on about an 80 per cent basis. Hot weather was partly responsible for this loss, but other factors also operated to reduce output, notably labor shortage. One mill which failed to claim exemption for any of its men in the first draft now has an insufficient supply of labor, and production suffers correspondingly. A western Pennsylvania plant produced a total of 106,000 tons of steel in August as against an average production of 135,000 tons in recent months.

The subject of prices for fourth quarter is uppermost in the iron and steel trade. Among those who will ask for higher prices are certain pig iron interests, class 3 makers of rolled steel products, makers of galvanized sheets and the smaller producers of wire products.

Coke.—A few contracts for coke for next year have recently been made. The reduction of 30c a ton in the price of by-product coke by the Fuel Administration brings the price down to \$5.70 per ton for run of ovens and \$6.70 for selected foundry. The Fuel Administration has penalized the Consolidated Coke Co., Pittsburgh, for shipping inferior bee-hive coke, and it must refund a total of \$80,000, a part of which goes to the Thomas Iron Co., Hokendauqua, Pa. We quote bee-hive coke at Connellsville ovens at \$6 a ton for blast furnace grade and \$7 a ton for foundry grade.

Pig Iron.—A meeting of the Associated Manufacturers of Merchant Pig Iron has been called for Wednesday morning at 10 o'clock at the Waldorf-Astoria Hotel, New York, to consider revision of pig iron prices for fourth quarter. The meeting will probably continue on Thursday. A formal request to the Committee on Steel and Steel Products of the American Iron and Steel Institute to ask the Price Fixing Committee of the War Industries Board for an advance in prices may result from this conference. It is known that at least two or three eastern Pennsylvania furnace companies, acting individually, have presented data to the general committee on the subject of pig iron manufacturing costs, together with a request for a price advance. Opinion in the trade is that no advance will be allowed by the War Industries Board which would apply to all furnaces, but there are a few who believe that consideration may be given to the regional plan of price-fixing, similar to that on coal and coke. An objection to the latter plan, however, is that any price advance on iron will be disturbing to manufacturers who have made contracts for Government work on the basis of existing iron prices, and it is believed that this objection will weigh heavily in the Washington price conference on Sept. 18. There are a few large inquiries in the market for basic iron for first quarter and first half, among them being one from the American Bridge Co. for 10,000 tons a month for first quarter for its Pencoyd plant and one from the American Steel & Wire Co. for 4000 tons a month for first quarter for its Worcester, Mass., works. An eastern Pennsylvania plate maker is also arranging for his iron supply for first half. Basic iron has been allocated to the Worth Steel Co., Claymont, Del., which ran out of iron a short while after starting up its new open-hearth furnaces. The monthly reports by blast furnaces to the War Industries Board show that many foundries had good-sized stocks of iron on hand on Aug. 31. Reports received by the iron companies from consumers were surprising in view of the many urgent calls for shipments. For example, a certain foundry which received shipments of 1100 tons in July and August on Government allocation had 700 tons remaining on Aug. 31. Not all foundries are so fortunate, for serious shortages are noted from some reports. By getting reports of consumers' stocks, the War Industries Board will doubtless be able to distribute iron more evenly. It is asserted that Government departments sometimes overstate the needs of manufacturers doing work for them and thus more iron is shipped to these consumers than they really need to keep going. Very little is being said about iron business for next year, as sellers do not want to encourage requests from consumers whose right to a full supply of iron is in doubt. Some sellers who say they have not formally opened their books for next year are taking a few orders where there is no question as to the consumer being 100 per cent engaged in war work. Sales for nearby delivery are limited to off-grade iron, for which there is an urgent demand. A tin plate company has been seeking off-grade basic, but such iron usually sells as forge iron, the price for which is the same as for basic. Foundries will pay fancy prices for off-grade iron. For example, a mixed carload running from 1.65 to 4.38 per cent silicon and 0.95 to 4.96 per cent manganese, with sulphur and phosphorus about normal, was sold a few days ago at the Government schedule with extras for the high silicon and high manganese. Some of the iron brought \$45 a ton at furnace. Another lot of iron running 10 to 12 per cent in manganese was sold under the spiegeleisen quo-

tation, thus commanding a price much higher than permissible if sold as pig iron. The Oxford furnace of the Empire Steel & Iron Co. has blown out for re-lining. We quote standard grades of iron f.o.b. furnace except Virginia iron for which delivered prices are quoted:

Eastern Pennsylvania No. 1 X.....	\$34.00
Eastern Pennsylvania No. 2 X.....	33.50
Eastern Pennsylvania No. 2 foundry.....	33.00
Virginia No. 2 X (including freight).....	37.60
Virginia No. 2 foundry (including freight)...	37.10
Basic	32.00
Gray forge	32.00
Bessemer	35.20
Standard low phosphorus	53.00
Low phosphorus (copper bearings).....	50.00

Ferroalloys.—The Marietta furnace of the Lavino Furnace Co., Philadelphia, blew in on pig iron on Aug. 28, but later changed to ferromanganese. This interest states that it has not curtailed production of ferromanganese, as has been said might be done at the suggestion of the War Industries Board. It is reported that more furnaces will soon be ordered on basic pig iron, and this might affect certain furnaces now producing ferromanganese and spiegeleisen. A possibility is that one of the steel companies making ferromanganese may be ordered on basic and its supply of ferromanganese allocated to it from another source. The demand for ferromanganese and spiegeleisen is exceedingly light, but producers are able to ship all they make on contracts. Prices continue without change, \$250 for 70 per cent ferromanganese, freight allowed, and \$75 for 16 to 18 per cent spiegeleisen, f.o.b. furnace. Ferrotungsten is strong at \$2.50 per lb. of contained tungsten.

Billets.—The situation as to billets is without change. We quote 4 x 4-in. open hearth rerolling billets at \$51.30, Philadelphia.

Wire Products.—Frank Baackes, chairman of the Sub-Committee on Wire Products, American Iron and Steel Institute, called a meeting of the committee for today (Tuesday) to discuss a revision of wire prices, particularly wire nails, for fourth quarter. Some of the smaller manufacturers are said to have complained that the wire nail price is too low for profit.

Plates.—Makers of plates have been urged to speed up shipments to locomotive plants. The Baldwin Locomotive Works, Philadelphia, is now working almost exclusively on standardized locomotives for France, its production being at the rate of 70 a week. The Vulcan Iron Works, Wilkes-Barre, Pa., has received a contract for 125 standardized locomotives and arrangements have been made for the steel. Charles Piez, general manager of the Emergency Fleet Corporation, has announced that it will be impossible for the Hog Island shipyard to launch 50 ships this year, as was expected might be done. Shortage of skilled labor is one reason. Another is said to be the fact that the fabrication of ship material is proceeding unevenly. Some shops are not more than 50 per cent ahead on their schedule, while others have done better than 100 per cent. Thus there is an abundance of certain fabricated parts and a scarcity of others. This situation will be remedied as speedily as possible. We quote plates at 3.48c. Philadelphia.

Structural Material.—The market is almost bare of building projects. The Government itself is not using steel for buildings except when absolutely necessary. The Navy Department is now constructing many wooden buildings. We quote structural material at 3.23c., Philadelphia.

Iron and Steel Bars.—Increasing demand of the Government for shell bars is creating a greater shortage of commercial steel bars. Jobbers are in many instances out of stock and have no hope of replenishment. From the jobbers' point of view, the new regulations of the War Industries Board are not working out very satisfactorily because the jobbers' classification of B-4 is too far down the list of priorities to bring prompt shipments. Some of the jobbers seem to have thought that by filing a statement of the quantity of steel they sold in a month they would be shipped an equal quantity from the mills within a reasonably short time. They have now found, however, that their order must

take the course which the B-4 priority gives it, and in some cases this is no better than nothing at all. Many blacksmiths' and wheelwrights' shops throughout the country are closing for lack of bar iron. We quote soft steel bars at 3.13c. and bar iron at 3.73c., Philadelphia.

Sheets.—Manufacturers of galvanized sheets have asked for a higher price, and their request will probably be presented to the Price Fixing Committee of the War Industries Board on Sept. 18, when the price conference with the general committee of the American Iron and Steel Institute takes place. The high price of spelter is the principal reason given for an advance. It is stated that when the 6.25c. base price on galvanized sheets was fixed on Nov. 6, 1917, the price of spelter was 6c. to 7.50c. per lb., while now it has advanced above 9c. Further curtailment of sheet production, possibly to 50 per cent of capacity, is expected, but an effort will be made to put this curtailment into effect in such a way that it will not reduce too greatly the rolling of heavy sheets, for which the demand is greatest. At present there are urgent demands for heavy blue annealed sheets for gasoline containers for shipping gasoline to France, for powder cans and other important war work. One inquiry calls for 21,000 sheets of one size. We quote No. 10 blue annealed sheets at 4.48c.; No. 28 black sheets at 5.23c., and No. 28 galvanized at 6.48c., all Philadelphia.

Old Material.—A meeting of the Sub-Committee on Scrap Iron and Steel, American Iron and Steel Institute, was held today (Tuesday) in Philadelphia. Prices for fourth quarter were discussed, but it was stated positively by Chairman W. Vernon Phillips that no advance would be recommended by the sub-committee. A few slight changes in the regulations may be made. The sub-committee is endeavoring to obtain supplies of scrap from all possible sources to relieve the existing scarcity. Complaint has been made from some of the Western agricultural States that the price of scrap is not high enough to move it to consuming centers. In such cases, special permits may be issued by the sub-committee, which will make it profitable to move the scrap. Dealers bid on several railroad lists this week, but such bidding is now largely perfunctory, as scarcely any of the scrap comes to dealers, fully 80 or 90 per cent of it being sold by the roads direct to consumers. We quote for delivery at buyers' works, eastern Pennsylvania, as follows:

No. 1 heavy melting steel.....	\$29.00
Steel rails, rerolling.....	34.00
No. 1 low phosphorus heavy, 0.04 and under..	39.00
Low phosphorus, 0.04 and under.....	36.50
Low phosphorus, 0.06 and under....	\$32.00 to 34.00
Old iron rails.....	39.00
Old carwheels	29.00
No. 1 railroad wrought.....	34.00
No. 1 yard wrought.....	33.00
Country yard wrought.....	29.00
No. 1 forge fire.....	\$28.00 to 29.00
Bundled skeleton	28.00 to 29.00
No. 1 busheling.....	31.00
No. 2 busheling.....	19.00 to 20.00
Turnings (for blast furnace use)....	18.50 to 19.00
Machine-shop turnings (for rolling mill use)	18.50 to 19.00
Cast borings (for blast furnace use)....	18.50 to 19.00
Cast borings (clean).....	19.00
No. 1 cast (for steel plant use)	29.00
No. 1 cast (cupola sizes).....	34.00
Grate bars	28.00 to 29.00
Stove plate	28.00 to 29.00
Railroad malleable (for steel plants).....	29.00
Railroad malleable (for malleable works)....	34.00
Wrought iron and soft steel pipes and tubes (new specifications).....	33.00
Ungraded pipe	29.00

St. Louis

ST. LOUIS, Sept. 9.

Pig Iron.—Inasmuch as practically all the iron coming into this industrial district is on Government allotment, the representatives of the furnaces continue to have comparatively little to do except to look after the shipments from their furnaces and attend to the traffic details. Because of the allotment system, representatives continue to put on their books the names of numerous new concerns which have hitherto drawn

their supplies from other directions, but are now taking their allotments through the St. Louis offices as being in their industrial zone. Some few lots of surplus, off-analysis iron continue to be sold as occasion offers and they are all snapped up quickly regardless of the analyses. An increasing number of industries are taking on war work and this is adding to the quantity of iron coming into the St. Louis district.

Coke—The announced reduction of 30c in the by-product coke price has had no immediate effect on the situation, as the consumers here are either contracted up to the ovens' capacity or are getting their fuel under Government orders and thus are not immediately concerned in the market other than that they will have a smaller price to pay for the fuel they get.

Finished Iron and Steel—In finished products, there has been no material change in the situation—there could be none in the present state of the supply available. Mills are giving scant attention to those concerned in other than military work and warehouses are severely censoring orders placed with them. Stocks in warehouses are much depleted and deliveries of warehouse material is becoming somewhat deferred in many cases. For stock out of warehouse we quote as follows: Soft steel bars, 4.24c; iron bars, 4.24c; structural material, 4.34c; tank plates, 4.59c; No. 8 sheets, 5.54c; No. 10 blue annealed sheets, 5.59c; No. 28 black sheets, cold rolled, one pass, 6.59c; No. 28 galvanized sheets, black sheet gauge, 7.84c.

Old Material—Dealers continue to find it difficult to do business with short supplies of scrap immediately available and very little in their yards while lists from railroads and other sources are few and small in tonnage. The industries of the St. Louis district would pay freely, if material were available, as their yards are running low and their contracts are approaching expiration requiring attention. Up to the present, it has been possible to get along, but there are increasing indications of difficulty unless supplies are increased. Dealers continue practically on the Government basis, with the commission allowance being paid by consumers whenever it is possible to get scrap. Being practically on a Government basis as to prices, there is necessarily very little variation in quotations. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails.....	\$37.00 to \$37.50
Old steel rails, rerolling.....	33.50 to 34.00
Old steel rails, less than 3 ft.....	31.00 to 31.50
Relaying rails, standard sections, subject to inspection.....	55.00 to 65.00
Old carwheels.....	28.50 to 29.00
No. 1 railroad heavy melting steel scrap.....	28.50 to 29.00
Heavy shoveling steel.....	27.00 to 27.50
Ordinary shoveling steel.....	26.50 to 27.00
Frogs, switches and guards, cut apart.....	28.50 to 29.00
Ordinary bundled sheet scrap.....	23.00 to 23.50
Heavy axle and tire turnings.....	20.50 to 21.00

Per Net Ton	
Iron angle bars.....	\$33.00 to \$33.50
Steel angle bars.....	27.00 to 27.50
Iron car axles.....	40.00 to 40.50
Steel car axles.....	40.00 to 40.50
Wrought arch bars and transoms.....	40.00 to 40.50
No. 1 railroad wrought.....	28.50 to 29.00
No. 2 railroad wrought.....	27.50 to 28.00
Railroad springs.....	29.50 to 30.00
Steel couplers and knuckles.....	29.50 to 30.00
Locomotive tires, 42 in. and over, smooth inside.....	27.00 to 27.50
No. 1 dealers' forge.....	26.00 to 26.50
Cast-iron borings.....	16.25 to 16.75
No. 1 bushelling.....	25.50 to 26.00
No. 1 boilers cut to sheets and rings.....	22.50 to 23.00
No. 1 railroad cast scrap.....	28.00 to 28.50
Stove plate and light cast scrap.....	23.00 to 23.50
Railroad malleable.....	26.00 to 26.50
Agricultural malleable.....	25.00 to 25.50
Pipes and flues.....	23.00 to 23.50
Heavy railroad sheet and tank scrap.....	22.50 to 23.00
Railroad grate bars.....	20.00 to 20.50
Machine shop trimmings.....	16.00 to 16.50
Country mixed scrap.....	19.50 to 20.00
Uncut railroad mixed scrap.....	23.50 to 24.00

The Lakewood Engineering Co., Cleveland, announces the opening of new offices in Chicago in the Chamber Exchange Building, the staff consisting of A. Allen, A. W. French, E. W. Cox and E. E. Zeiss.

Birmingham

BIRMINGHAM, ALA., Sept. 9.

Pig Iron—Allocations of foundry metal were not as heavy as usual during the past week and no additional basic was placed, but furnaces have about all they can handle. The first indication of improved furnace practice is afforded in the August output of 209,000 tons, an increase of 9000 tons over July and compared with 232,000 in August, 1917. The decrease over last year is less than that of any month this year. Two new furnaces came in, one of the Sheffield Iron Corporation at Sheffield and one of the Central Coal & Iron Co. at Holt. There is said to be reason to expect early operations at Talladega. As a rule, raw material conditions have improved with the advent of better weather and, while the output of coal the past week was under record, that is attributable to special causes and does not carry the suggestion that the quicker pace at mines recently established will slow up. Some off-grade metal is disposed of as made in the open market and some orders have been booked for regular customers engaged in war work for 1919, but, as a rule, makers are fighting shy of 1919 commitments. The addition of three furnaces to the basic metal side has cut down the amount of foundry iron available on the part of Alabama furnaces, and the cry for those grades is more acute. Foundries are completing their report of steel on hand. They are busy as a rule, although stove foundries are not at all certain as to their future, especially those which have not taken on manufacture of castings for war purposes. Deliveries of Southern iron to Northern consumers are necessarily slow owing to the tonnage allocated for new customers. A lot of the domestic basic now being made here is going to steel works at Philadelphia and other points in the East which are making steel for the United States Shipping Board. Delivery is being made of the English basic. We quote per gross ton f.o.b. Alabama district furnaces as follows:

No. 2 foundry and soft.....	\$33.00
Basic.....	32.00

Old Material—Nothing came of the visit of Middle Western scrap consumers who sounded the Birmingham market two weeks ago. They found it impossible to compete with the Southern consumers owing to freight rates. However, the local scrap situation has improved and prices have advanced. In one or two instances, there have been reports of sales at more than Government prices, but as a rule the maximum is not paid. We quote per gross ton delivered in Birmingham district as follows:

Old steel axles.....	\$35.00 to \$36.00
Old steel rails.....	28.00 to 30.00
Heavy melting steel.....	27.00 to 27.50
No. 1 railroad wrought.....	28.00 to 30.00
No. 1 cast.....	27.50 to 28.50
Old carwheels.....	29.00
Tramcar wheels.....	26.00 to 26.50
Machine shop turnings.....	15.00 to 16.00
Cast-iron borings.....	15.00 to 16.00
Stove plate.....	25.00 to 26.00

Small consumers in the Birmingham district and adjacent territory are paying maximum Government prices for cast scrap, viz., \$29 in unbroken lots and as high as \$34.00 in cupola sizes of 150 lb. maximum, delivered.

Cast Iron Pipe—The leading interest reports the manufacture of considerable quantities of pipe and castings for such plants as the Nashville powder works and other Government purposes. Louisiana is expected to pass a law permitting cities to pool interests financially in laying pipe lines from gas fields. This holds out a prospect of several hundred miles of 12-in. pipe. A good deal of pipe is also going to oil wells in Texas. Sanitary pipe manufacture is not brisk.

Coal and Coke—The last week's coal production fell to 390,000 tons in Alabama compared with a high record of 433,000 tons owing to paydays, but the slack is not general and the pace is expected to be maintained. There is report in industrial circles that the Texas Steel Co., which acquired the properties of the Rust Iron Co., has secured coal lands in Alabama near Birmingham and proposes to mine coal and manufacture coke there for use in the Texas plants.

Buffalo

BUFFALO, Sept. 9.

Pig Iron.—The announcement of the new preference list of industries by the chairman of the War Industries Board clarifies the situation immensely in the opinion of pig iron producers and tends to make classification easier and almost automatic in determining the order of shipment and in the making up of Government reports. Opinions of producers in this territory vary as to whether production can be made to equal the aggregate of requirements for war needs and essential work, but the belief of the majority appears to be that there will be sufficient iron to fill essential needs for the remainder of 1918, but they are not quite so optimistic as to the ability of furnaces to produce the full measure of requirements for next year's program. The furnaces of the district are heavily sold up on Government and essential business for a long period ahead. One of the largest producers made an analysis of unfilled orders on its books the other day and found that over 95 per cent was direct war and essential business, it being entirely filled up on foundry and malleable and having only a very little basic available for forward delivery. Apparently no 1919 contracting is now going on, but allocation is proceeding steadily and will, it is expected, absorb full output well into 1919. There were some sales of carload lots during the week to small consumers who claimed they would be forced to suspend without this help. Their claims were investigated and the tonnage allowed them. We continue the Government price schedule, f.o.b. furnace, Buffalo:

No. 1 foundry, 2.75 to 3.25 silicon.....	\$34.50
No. 2 X, 2.25 to 2.75 silicon.....	33.50
No. 3 foundry, 1.75 to 2.25 silicon.....	32.50
Gray forge	32.00
Malleable	33.50
Basic	32.00
Lake Superior charcoal, regular grades, f.o.b.	
Buffalo	37.50

Old Material.—The difficulty of obtaining labor for assembling and shipping stock is cutting down the volume of trading to some extent, although demand is heavy for all grades of scrap and dealers are able to dispose promptly of all tonnages they have ready for shipment, the factor of labor shortage being the principal hindrance working against a larger total of transactions. Many dealers state that with the increased cost of assembling, assorting and distributing of scrap caused by the high cost of labor, and with the Government prices fixed, there is very little profit left for them. One dealer said he feared the increasing scarcity and high cost of labor might cause him to face the possibility of closing down his yard. The need and demand for heavy melting steel and other heavy grades of scrap is very large and far ahead of supplies that seem likely to be available in the near future. We quote the current price schedule as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel.....	\$29.00
No. 1 low phosphorus, heavy, 0.04 and under..	39.00
Low phosphorus, 0.04 and under.....	36.50
Low phosphorus, not guaranteed.....	34.00
No. 1 railroad wrought.....	34.00
No. 1 railroad and machinery cast.....	34.00
Iron axles	\$44.00 to 46.00
Steel axles	44.00 to 46.00
Carwheels	29.00
Railroad malleable	34.00
Machine shop turnings	17.00 to 17.50
Heavy axle turnings.....	24.00
Clean cast borings.....	18.00 to 19.00
Iron rails	36.00 to 37.00
Locomotive grate bars.....	27.50 to 28.00
Stove plate	27.50 to 28.00
Wrought pipe	27.00 to 28.00
No. 1 busheling scrap.....	29.00 to 30.00
No. 2 busheling scrap.....	21.00 to 23.00
Bundled sheet stamping scrap.....	21.00 to 23.00

Finished Iron and Steel.—Government demand for steel for shells, for ships, for cars, for aircraft and other strictly military requirements caused by the aggressiveness of the troops on the western front leaves the mills with practically no steel for commercial distribution. It is becoming very evident that jobbers' stocks cannot be replenished, even under the B 4 priority granted by the War Industries Board. This is caus-

ing the jobbers considerable worry, but they hope they may be given a higher classification. A move of considerable importance to the steel interests is the practical taking over of the operation of steel plants in Canada by Government officials, the details of which are not yet clearly understood by the trade. Considerable difficulty is being experienced at some Canadian points in obtaining promptly sufficient quantities of steel and materials for shipbuilding purposes to keep up rapid construction. The Lackawanna Bridge Co., Buffalo, has the contract for the 200 tons of structural steel for the boiler shop extension at the American Locomotive Co. works at Dunkirk.

New York

NEW YORK, Sept. 10.

Pig Iron.—Interest centers in the meeting of the pig iron manufacturers which is to be held in New York, to-morrow, to consider the price situation and make recommendations as to prices for the last quarter of the year. The Virginia operators will make strong showing in favor of an advance in prices and the Alabama furnace owners will also be active. Furnaces are very carefully carrying out the request of Director of Steel Supply Replogle to collect information in regard to stocks of iron in the hands of melters as to the character of the business which is being done by the foundries. While the furnaces vary somewhat in carrying out the request, some going into greater detail than others, inquiries usually include the following questions:

1. Stock of iron on hand and in transit on last day of month.
2. Percentage of direct Government orders on your books at end of month.
3. Percentage of indirect Government orders on your books at end of month.
4. Percentage of direct Allied Governments' orders on your books at end of month.
5. Percentage of indirect Allied Governments' orders on your books at end of month.
6. Percentage of orders considered essential on books at end of month.
7. Percentage of orders considered less essential on books at end of month.
8. Percentage of direct Government shipments during month.
9. Percentage of indirect Government shipments during month.
10. Percentage of direct Allied Governments' shipments during month.
11. Percentage of indirect Allied Governments' shipments during month.
12. Percentage of shipments considered essential during month.
13. Percentage of shipments considered less essential during month.

In some cases, reports indicate that foundries are in an unexpectedly good condition as to supplies of pig iron, but many are operating on a hand to mouth basis. We quote prices as follows for tidewater delivery for Northern and Southern grades:

No. 1 X.....	\$35.40
No. 2 X.....	34.00
No. 2 plain.....	32.50
No. 2 X Virginia	37.50
No. 1 Southern (all rail).....	42.20
No. 2 Southern (all rail).....	40.70

Ferroalloys.—A question has been raised as to the possibility of a shortage of spiegeleisen and the adequacy of domestic ferromanganese output. At the same time less is heard about turning on to pig iron certain blast furnaces now operating on the above product. The suggestion has been made on behalf of merchant interests that some large steel companies now making ferromanganese might produce pig iron in their large furnaces instead of ferromanganese which they could purchase of other makers. That, however, might mean a resumption of imports from Great Britain, which is not now contemplated. The demand for ferromanganese is light. The two large inquiries for the first half of 1919, noted last week, have not yet been satisfied. The consumers have altered their demands to some extent, one cutting them in two, making the inquiry for one

750 tons of ferromanganese and about 1200 tons of spiegeleisen. The quotation for 70 per cent alloy is \$2.50, delivered, with \$3.50 per unit added or subtracted. The spiegeleisen market is strong at \$75, furnace, for 16 to 18 per cent alloy, and \$82, furnace, for 18 to 20 per cent material. There have been sales of both ferromanganese and spiegeleisen in moderate quantities for all deliveries in the past week. Ferrosilicon, 50 per cent, is in fair demand for 1919 delivery, for which the quotation is about \$155, delivered, with \$160 to \$165 asked for prompt. There is an inquiry for 2400 to 3000 tons for delivery in 1919 from a Middle Western steel company.

Cast Iron Pipe.—Although cast-iron pipe shops are not included in the preference list of industries announced by the War Industries Board, gas plants and water supply companies are included in class 2 and cast-iron pipe manufacturers believe they are protected in this way, although they would prefer to be specifically mentioned. Government prices, including freight, are based on \$62.70, delivered, New York, but the prices usually quoted are as follows: \$61.75, New York, for 4-in. and heavier; \$64.75 for 4-in.; \$71.75 for 3-in., with \$1 additional for class A and gas pipe.

Old Material.—Dealers in old material are disappointed not to find scrap listed as an essential by the War Industries Board, but they are confident that even if not so listed, the industry will be given due consideration in the enforcement of the new draft law and in other ways, as the steel plants are badly in need of all the scrap they can get and the carrying on of the war would be seriously handicapped if the scrap business should be crippled. The demand at present is very active. We quote buying prices of dealers and brokers, per gross ton, New York, as follows:

Heavy melting steel.....	\$26.20
Rerolling rails	30.80
Relaying rails	\$60.00 to 70.00
Iron and steel car axles.....	43.70
No. 1 railroad wrought.....	30.80
No. 1 railroad wrought, cut to not less than 10 in. or over 24 in.....	35.80
Wrought-iron track scrap.....	28.80
Forge fire	25.00 to 25.50
No. 1 yard wrought, long.....	29.80
Light iron	10.00 to 11.00
Cast borings (clean).....	16.25 to 16.50
Machine-shop turnings.....	16.25 to 16.50
Mixed borings and turnings.....	16.25 to 16.50
Iron and steel pipe (1 in. minimum diameter), not under 2 ft. long.....	29.80
Stove pipe	26.20
Locomotive grate bars.....	26.20
Malleable cast (railroad).....	31.20
Old carwheels	26.20
Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, are:	
No. 1 machinery cast.....	\$34.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	34.00
No. 1 heavy cast, not cupola size.....	29.00
No. 1 cast (radiators, cast boilers, etc.).....	29.00

Finished Iron and Steel.—It is believed that all contracting for structural steel for essential work will be practically completed before the end of the year. If this should prove to be a fact, the volume of business to be taken by the bridge and structural shops of the country will drop below the average so far this year, which is less than 65 per cent, as practically all the fabricated ship work for 1919 has likewise been booked. This is of no special concern to fabricators with their decreased working organizations, but it also presupposes little bridge work from the railroads. Considerable business on this account was earlier expected, but the financial showing of railroads is regarded as against the possibility. The leading structural work up for consideration in the week involved several bascule bridges and lock gates for the connecting of Lake Pontchartrain with the Mississippi River, but the bids received from the Bethlehem Steel Bridge Corporation, the American Bridge Co. and the McClintic-Marshall Co. were all rejected for reasons not known at this writing. The Phoenix Bridge Co. has taken a contract for 1200 tons for the Allegheny division of the Pennsylvania Railroad, which has in addition a number of small structural jobs to be let, totaling 300 tons. Other work put under contract includes 200 tons for a crane-way at Plainfield, N. J., for the Niles-Bement-Pond Co.,

and 230 tons for a railroad subway at New Haven. Awards are expected in the week on the 4000 narrow gage cars for France, but nothing has been done on the request made some weeks ago by the Baltimore & Ohio for prices on 1100 car bodies. In the last case apparently the company planned, if prices were low enough, to utilize trucks from existing rolling stock. With some mills bar iron is sold only on indefinite delivery, but this is not true of all of them. Discard shell steel is readily obtainable in billet form and more of it could be moved if rolling mills could be obtained capable of breaking down to, say, concrete bars steel of the shell specification. Exporting is naturally quiet with railroad permits much more difficult to get than export licenses, but occasionally some extra vessel space is obtainable for the prompt shipment out of warehouse of good sized tonnages, if the steel is not otherwise immediately available at seaboard. Jobbers are not receiving mill deliveries under the B-4 classification at a rate proportionate to the distribution from their stocks and many are getting so low in this regard that their future is beginning to be a matter of great concern to them. We quote mill shipments as follows: Steel bars, 3.145c.; shapes, 3.245c.; plates, 3.495c.; and bar iron, 3.745c., all New York. Out-of-store prices are 1c. higher.

Cincinnati

CINCINNATI, Sept. 10—(By wire).

Pig Iron.—The inquiry for first half iron is diminishing and sales are light. No Southern furnace has any future iron to offer with the exception of a few small lots that are occasionally placed with favored customers but all contracts have a clause relieving the seller from shipping the iron allocated later to a more important industry. A melter in southern Ohio, who has been taking some business quietly for future shipment, is now practically out of the market, several firms now devoting practically their entire attention to hurrying forward shipments of iron on urgent contracts and to the sale of ferroalloys. Lately quite a respectable tonnage of ferrosilicon and ferromanganese has been placed by different firms. Mill cinder is also receiving attention from some and these heretofore considered side lines will undoubtedly receive more attention in the future. High sulphur iron that could be obtained in the South in odd lots is disappearing and sales lately have been very much curtailed. The steel mills are apparently not concerned about the future, as all have urgent war contracts. Many foundries previously engaged in making small non-essential castings have abandoned their previous work and are taking orders from firms having war work in hand.

Based on freight rates of \$3.60 from Birmingham and \$1.80 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, No. 2 foundry and No. 2 soft.....	\$36.60
Southern Ohio, No. 2.....	34.80
Basic, Northern	33.80

Coke.—The closing down of a number of furnaces in several districts for repairs has enabled the ovens to produce some foundry coke that is being shipped as fast as possible to consumers in this territory. From a foundryman's standpoint the situation is more comfortable than at this time last year and present indications are that sufficient fuel will be accumulated before the winter season sets in to carry them through that period, unless transportation difficulties hinder operations. A large number of foundries have contracted for first half year supply of coke and sales at the present time are limited to a little prompt fuel needed to fill in. Shipments from all fields now are moving in a satisfactory manner.

Finished Material.—Reports from the jobbers all agree that no appreciable relief has been afforded in shipments from the mills. This is somewhat of a disappointment, as it was thought the tacit promises to replenish stocks during the month of September could be carried out. As a consequence, warehouse stocks are now smaller than they have been in years, and this includes all kinds of finished material. Urgent calls

from firms in the Pittsburgh district are received daily, but just now jobbers are not able to take care of many outside orders, no matter how urgent the demand may be from firms which have war work in hand.

The following are local jobbers' prices: Steel bars and small structural shapes, 4.13c. base; large rounds and squares 2 in. and over, 4.23c. base; plates, 4.48c. base; No. 10 blue annealed sheets, 5.48c.; steel bands, 3/16 in. and lighter, 4.98c. base (using the new band list). Reinforcing concrete bars, 4.23c., and wire nails, \$4.25 to \$4.50 per keg base.

Old Material.—The maximum price of \$34 per gross ton on No. 1 machinery cast scrap delivered at consumers' plants has been reached. The maximum on No. 1 railroad wrought is slightly below the Government quotation, but on account of its scarcity it is probable that this grade of scrap will soon be advanced by all dealers. Cast borings do not seem to be able to pick up the strength that other grades of scrap show, because they have to be shipped to other territory, as almost none of this kind of scrap is bought for consumption in this immediate vicinity. The following are dealers' prices f.o.b. at yards, Cincinnati and southern Ohio, in carload lots:

Per Gross Ton	
Bundled sheet scrap.....	\$21.50 to \$32.50
Old iron rails.....	33.50 to 34.00
Relaying rails, 50 lb. and up.....	44.50 to 45.00
Rerolling steel rails.....	32.00 to 32.50
Heavy melting steel scrap.....	27.50 to 28.00
Steel rails for melting.....	27.50 to 28.00
Old carwheels.....	29.00 to 29.50

Per Net Ton	
No. 1 railroad wrought.....	\$29.50 to \$30.00
Cast borings.....	13.50 to 14.00
Steel turnings.....	14.50 to 15.00
Railroad cast.....	25.00 to 25.50
No. 1 machinery.....	29.50 to 30.00
Burnt scrap.....	17.50 to 18.00
Iron axles.....	40.00 to 40.50
Locomotive tires (smooth inside).....	35.50 to 36.00
Pipes and flues.....	21.00 to 21.50
Malleable cast.....	24.50 to 25.00
Railroad tank and sheet.....	18.50 to 19.00

Cleveland

CLEVELAND, Sept. 10.

Iron Ore.—Complaints of a labor shortage are becoming more frequent in the Lake Superior mining districts in the Mesaba and particularly in the Gogebic and Cuyuna ranges. The shortage has necessitated a curtailment of the production of manganiferous ores in the Cuyuna range for which there has been an abnormal demand this year. Stock piles at the underground mines in the various ranges have been well cut down, and it is expected that these piles will be about cleaned up when navigation closes. One ore sale, 10,000 tons of a silicious grade, was made during the week. More ore carriers are being diverted to the Lake Michigan grain trade and as soon as the grain movement has started from ports at the head of Lake Superior, considerable additional vessel tonnage will have to be withdrawn from the ore trade. We quote, f.o.b., lower Lake docks, as follows:

Old range Bessemer, \$6.40; old range non-Bessemer, \$5.65; Mesaba Bessemer, \$6.15; Mesaba non-Bessemer, \$5.50.

Pig Iron.—Allocations of pig iron last week by the pig iron committee amounted to 81,000 tons, a gain of 6000 tons over the previous week. Total allocations from May 1 to Sept. 7 were 915,000 tons. Last week's allocations showed a marked increase in the demand for low phosphorus iron, a greater demand for Bessemer, a falling off in calls for foundry iron, and about the same amount of basic iron placed as during the previous week. The allocations include 21,000 tons of low phosphorus, 29,000 tons of basic, 11,000 tons of Bessemer, 16,000 tons of foundry, 3000 tons of malleable iron and the remainder in charcoal and silvery grades. The pig iron situation appears to be growing tighter all around, and because of Government allocations producers are finding it increasingly difficult to keep up shipments as required on orders from regular customers doing Government work. The demand for Northern foundry iron for the first half of next year has largely subsided. A great deal of tonnage has been sold in this territory and producers are not inclined to further increase their order books. There is a great deal of inquiry for Southern iron for the first half of next year, but producers are declining to make sales. Consumers

have asked selling agencies to hold the orders and accept them for at least part of the desired tonnages when the producers open their books. We note the sale of 3000 tons of Southern charcoal iron in several lots for the first half to consumers in the Pittsburgh territory. A number of larger Cleveland foundries are now figuring on Government contracts for semi-steel shells, trench mortar parts and gas bombs. We quote delivered Cleveland, as follows:

Bessemer.....	\$36.60
Basic.....	33.40
Northern No. 2 foundry.....	33.40
Southern No. 2 foundry.....	38.00
Gray forge.....	32.40
Ohio silvery, 8 per cent silicon.....	47.90
Standard low phosphorus, Valley furnace.....	53.00

Old Material.—The demand for scrap is still in excess of the supply and the market is very firm with the Government prices ruling on nearly all grades. A great deal of mixed scrap is being shipped to yard dealers to be sorted and sheared. The demand for borings and turnings continues heavy and both grades are scarce. Owing to the scarcity of heavy melting steel, some mills that usually place their low phosphorus scrap on the market are using this grade in their open-hearth furnaces. Cupola cast scrap is in good demand and is moving at the Government price plus commission. Busheling is quiet and dealers are finding it difficult to sell this grade at the Government price plus commission. We quote delivered consumers' yards in Cleveland and vicinity as follows:

Per Gross Ton	
Steel rails.....	\$25.00 to \$29.00
Steel rails, under 3 ft.....	34.00
Steel rails, rerolling.....	34.00
Iron rails.....	39.00
Iron car axles.....	46.50
Steel car axles.....	46.50
Heavy melting steel.....	29.00
Cast borings.....	19.00
Iron and steel turnings and drillings.....	19.00
Hydraulic compressed sheet scrap.....	28.00 to 29.00
No. 1 railroad wrought.....	34.00
Cast-iron carwheels, unbroken.....	29.00
Cast-iron carwheels, broken.....	34.00
Agricultural malleable.....	29.00 to 30.00
Railroad malleable.....	34.00
Steel axle turnings.....	24.00
Light bundled sheet scrap.....	24.50 to 25.00
Cast-iron scrap.....	29.00
Cast-iron scrap, broken to cupola size.....	34.00
No. 1 busheling.....	30.00 to 31.00

Per Net Ton	
Railroad grate bars.....	\$24.00 to \$25.00
Stove plate.....	24.00 to 25.00

Finished Iron and Steel.—The new preference list of industries and plants announced by the War Industries Board is received with favor by the iron and steel trade, as it is expected to simplify some of the problems that are frequently coming up over the distribution of material. New inquiry for steel is light as most consumers are depending on direct Government allocations, or for small lots upon jobbers' stocks. Jobbers are now fairly well supplied with steel bars, largely rolled from shell discard, although mills are making some shipments of soft steel bars. The Government order allowing the use of only shell steel or bars rerolled from rails for reinforcing work will be of advantage to jobbers, as many architects have always specified soft steel bars in construction work. The demand for reinforcing bars for war plants is heavy. Two orders for shell steel in bars and shapes placed by a fabricator and jobber aggregated about 2500 tons. A northern Ohio manufacturer has placed 500 tons of bars and structural material for 180 boilers for Eastern shipyards. An Ohio steam shovel builder has placed 500 tons of structural material. The Hydraulic Pressed Steel Co. has received additional orders for about 10,000,000 75 mm. shell forgings. This company, with enlarged facilities, is now turning out 70,000 shell forgings per day. Mills will endeavor to supply the automobile trade with steel for the car production authorized for the remainder of the year, when the required permits are secured. Cleveland rolling mills are operating to capacity on railroad work and are now filled up for about 90 days on bar iron orders. Jobbers quote:

Steel bars, 4.07c.; plates, 4.42c.; structural material, 4.17c.; No. 10 blue annealed sheets, 5.42c.; No. 28 black sheets, 6.42c.; No. 28 galvanized sheets, 7.67c.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

An advance in freight rates of 25 per cent from Pittsburgh on finished iron and steel products, including wrought iron and steel pipe, went into effect June 1, 1918. The rates from Pittsburgh, in carloads, to points named, per 100 lb. are as follows: New York, 23c.; Philadelphia, 23c.; Boston, 27c.; Buffalo, 17c.; Cleveland, 17c.; Cincinnati, 23c.; Indianapolis, 25c.; Chicago, 27c.; St. Louis, 34c.; Kansas City, 59c.; St. Paul, 59c.; Denver, 99c.; Omaha, 59c.; minimum carload, 36,000 lb. to four last named points; New Orleans, 55c.; Birmingham, 57.5c.; Pacific Coast, \$1.25; minimum carload, 80,000 lb. To the Pacific Coast the rate on steel bars and structural steel is \$1.315, minimum carload 40,000 lb.; and \$1.25, minimum carload 50,000 lb. On wrought iron and steel pipe the rate from Pittsburgh to Kansas City is 50c. per 100 lb., minimum carload 46,000 lb.; to Omaha, 50c., minimum carload 46,000 lb.; to St. Paul and Minneapolis, 49.5c., minimum carload 46,000 lb.; Denver, 99c., minimum carload 46,000 lb. A 3 per cent transportation tax applies. On iron and steel items not noted above, rates vary somewhat and are given in detail in the regular railroad tariffs.

Structural Material

Beams, 3 to 15 in.; channels, 3 to 15 in. angles, 3 to 6 in. one or both legs, 1/4 in. thick and over, and zees, structural steel, 20.

Wire Products

Wire nails, \$3.50 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails taking an advance in price of \$2, and shorter than 1 in., \$2.50. Bright wire, \$3.55 per 100 lb.; annealed fence wire, Nos. 6 to 12; galvanized wire, \$3.95; galvanized barbed wire and staples, \$4.35; painted barbed wire, \$3.65; polished fence wire, \$2.45; cement-coated nails, \$3.40 base; these prices subject to the usual advances for the smaller trade, all at Pittsburgh, freight added to point of delivery, terms 60 days, less 2 per cent off for cash in 10 days. Discounts on wire-fencing are 47 per cent off list for carload lots, 46 per cent for 1000-rod lots, and 45 per cent off for small lots, at Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets, \$4.40 base for boiler rivets. 1/2 in. and shorter rivets, \$4.50 base for 1/2 in. smaller and shorter rivets. 50-10 per cent off list for bolts h.p. nuts, 3/4 in. x 4 in.; smaller and shorter, rolled threads, 50-10-5 per cent off list for larger and longer sizes, 40-10 per cent off list for bolts, c.p.c. and t. nuts, 3/4 in. x 4 in.; smaller and shorter, 40-10 per cent off list for larger and longer, 35-5 per cent off list for bolts, 3/4 x 6 in.; smaller and shorter, rolled threads, 50-5 per cent off list for larger and longer sizes, 40-10-5 per cent off list for bolts, 50-10 per cent off list for bolts, Nos. 1, 2, 3, 50 per cent off list for pressed nuts, sq., blank, 2.50c. per lb. off list for pressed nuts, hex., blank, 2.30c. per lb. off list for pressed nuts, sq., tapped, 2.30c. per lb. off list for pressed nuts, hex., tapped, 2.10c. per lb. off list for 1/2 in. and hex. nuts, blank, 2.25c. per lb. off list for 1/2 in. and hex. nuts, tapped, 2.00c. per lb. off list for 1/2 in. and larger, 60-10-10 per cent off list for 1/2 in. and smaller, 70-5 per cent off list for bolts, 70-10 per cent off list for bolts, 2 1/2 per cent extra for bulk for bolts, 50-10-5 per cent off list

The above discounts are from present lists now in effect. All prices carry standard extras.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$57; chain rods, \$65; screw, rivet and bolt rods and the rods of that character, \$65. Prices on high carbon rods are irregular. They range from \$70 to \$80, depending on classes.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16 in. x 4 1/4 in. and heavier, per 100 lb., \$3.50, in lots of 200 kegs of 200 lb. each, or more; track bolts, \$4.90. Boat spikes, \$5.25 per 100 lb. f.o.b. Pittsburgh

Terne Plate

Effective May 21 prices on all sizes of terne plates are as follows: 8-lb. coating, 200 lb., \$15 per package; 8-lb. coating, 10-lb. coating, 12-lb. coating, I. C., \$17.00; 15-lb. coating, I. C., \$19.60; 25-lb. coating, I. C., \$21.75; 35-lb. coating, I. C., \$24.00 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.90c. from mill. Refined iron bars, 3.50c. in carload and larger lots, f.o.b. mill.

Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card, as announced Nov. 5 by the Government on steel pipe, those on iron pipe being the same as quoted for some time:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1/8, 1/4 and 3/8	44	17 1/2	1/8 and 1/4	23	+4
1/2	48	33 1/2	3/8	24	+3
3/4 to 3	51	37 1/2	1/2	28	10
			3/4 to 1 1/2	33	17
Butt Weld			Lap Weld		
2	44	31 1/2	1 1/4	18	3
2 1/2 to 6	47	34 1/2	1 1/2	25	11
7 to 12	44	30 1/2	2	26	12
13 and 14	34 1/2	..	2 1/2 to 6	28	15
15	32	..	7 to 12	25	12
Butt Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
1/8, 1/4 and 3/8	40	22 1/2	1/8, 1/4 and 3/8	22	5
1/2	45	32 1/2	1/2	27	14
3/4 to 1 1/2	49	36 1/2	3/4 to 1 1/2	33	18
2 to 3	50	37 1/2			
Butt Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
2	42	30 1/2	1 1/4	19	4
2 1/2 to 6	45	33 1/2	1 1/2	25	11
7 to 12	44	32 1/2	2	27	14
13 and 14	40	26 1/2	2 1/2 to 6	29	17
15	35	21 1/2	7 to 12	28	16
			7 to 8	20	8
			9 to 12	15	3

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent. Prices for less than carloads are four (4) points lower basing (higher price) than the above discounts on black and 1 1/2 points on galvanized.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are seven (7) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are nine (9) points lower (higher price).

Boiler Tubes

The following are the prices for carload lots, f.o.b. Pittsburgh, announced Nov. 13, as agreed upon by manufacturers and the Government:

Lap Welded Steel		Charcoal Iron	
3 1/2 to 4 1/2 in.	34	3 1/2 to 4 1/2 in.	12 1/2
2 1/2 to 3 1/4 in.	24	3 to 3 1/4 in.	+ 5
2 1/4 in.	17 1/2	2 1/2 to 2 3/4 in.	+ 7 1/2
1 1/4 to 2 in.	13	2 to 2 1/4 in.	+ 22 1/2
		1 1/4 to 1 1/2 in.	+ 35
Standard Commercial Seamless—Cold Drawn or Hot Rolled		Per Net Ton	
1 in.	230	1 1/4 in.	220
1 1/4 in.	280	2 to 2 1/2 in.	190
1 3/4 in.	270	2 1/2 to 3 1/4 in.	180
1 1/2 in.	220	4 in.	200
		4 1/2 to 5 in.	220

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department, which will be subject to special negotiation.

Sheets

Makers' price for mill shipments on sheets of United States standard gage in carload and larger lots, are as follows:

Blue Annealed—Bessemer		Cents per lb.	
No. 8 and heavier	.....	4.20	
Nos. 9 and 10	.....	4.25	
Nos. 11 and 12	.....	4.30	
Nos. 13 and 14	.....	4.35	
Nos. 15 and 16	.....	4.45	
Box Annealed, One Pass Cold Rolled—Bessemer		Cents per lb.	
Nos. 17 to 21	.....	4.80	
Nos. 22 and 24	.....	4.85	
Nos. 25 and 26	.....	4.90	
No. 27	.....	4.95	
No. 28	.....	5.00	
No. 29	.....	5.10	
No. 30	.....	5.20	
Galvanized Black Sheet Gage—Bessemer		Cents per lb.	
Nos. 10 and 11	.....	5.25	
Nos. 12 and 14	.....	5.35	
Nos. 15 and 16	.....	5.50	
Nos. 17 to 21	.....	5.65	
Nos. 22 and 24	.....	5.80	
Nos. 25 and 26	.....	5.95	
No. 27	.....	6.10	
No. 28	.....	6.25	
No. 29	.....	6.50	
No. 30	.....	6.75	
Tin-Mill Black Plate—Bessemer		Cents per lb.	
Nos. 15 and 16	.....	4.80	
Nos. 17 to 21	.....	4.85	
Nos. 22 to 24	.....	4.90	
Nos. 25 and 27	.....	4.95	
No. 28	.....	5.00	
No. 29	.....	5.05	
No. 30	.....	5.05	
Nos. 30 1/2 and 31	.....	5.10	

Metal Markets

The Week's Prices

		Cents Per Pound for Early Delivery					
Copper, New York		Tin,	Lead		Spelter		
Sept.	Lake	Electro- lytic	New York	New York	St. Louis	New York	St. Louis
4.....	26.00	26.00	*83.00	8.05	7.75	9.37½	9.12½
5.....	26.00	26.00	*83.00	8.05	7.75	9.37½	9.12½
6.....	26.00	26.00	*83.00	8.05	7.75	9.37½	9.12½
7.....	26.00	26.00	.....	8.05	7.75	9.50	9.25
9.....	26.00	26.00	*83.00	8.05	7.75	9.50	9.25
10.....	26.00	26.00	*83.00	8.05	7.75	9.50	9.25

*Nominal.

NEW YORK, Sept. 11.

A strong tone continues to pervade all the markets, which are, however, relatively quiet. The labor situation is the principal cloud on the horizon of the copper market. Tin continues to ease and buying is negligible. There is no relief in the scarcity of lead. Spelter is sparingly offered and is very strong with an advancing tendency. Antimony is lifeless and lower.

New York

Copper.—Deliveries of the tremendous consumption of copper are being closely regulated by the Copper Producers' Committee and no dissatisfaction is heard of. There is concern, however, over the labor situation as it at present exists and still more anxiety as to conditions after the new draft goes into effect. Copper is a decidedly essential industry and its labor supply needs careful conservation. Already, however, the output of refined copper is falling, the August production being estimated by one authority at as low as 175,000,000 lb., compared with 205,000,000 lb. in July and 215,000,000 lb. in the spring months. The labor shortage is stated as preventing refineries from operating at greater than 75 per cent of capacity. The present price of 26c. continues until Nov. 1, when a higher price is talked of. Jobbing lots are sold at no higher than 27.35c. per lb.

Tin.—Drooping prices continue to keep buyers from entering the market, which continues extremely quiet. In the last month or six weeks sales of tin have been exceedingly small. In the last week no business at all has been reported. It is probable that metal for shipment from the East could probably be bought for 73c. per lb. as against 76.50c. a week ago and 97c. at the peak of the advance. An interesting report, unconfirmed, is to the effect that a new tin committee is to be or has been established as one result of the London conference. It is to be known as the Inter-Allied Tin Executive Committee and is to consist of two Englishmen, two Americans, one Chinaman, one Japanese and one Hollander. The idea is evidently to include in the centralized control all brands of tin, limiting profits and prices. There is no definite official information regarding this report so far. Deliveries of tin in August were 5953 tons, 3903 tons of this coming in at Pacific ports. The tin in stocks and landing Aug. 31 was 715 tons. Tin imports to Sept. 1 have been 42,414 tons, of which 23,323 tons came from the Straits Settlements. In the same eight months in 1917 the total imports were 39,130 tons. The London market is also easing, spot Straits having been quoted yesterday at £343 10s. as against £353 10s. per ton a week ago.

Lead.—Conditions have not changed and there is no prospect of any relief in the scarcity of the metal. The lead producers' committee is strictly controlling the sales and distribution of practically every ton, so serious is the shortage. Prices are voluntarily controlled at 7.75c., St. Louis, or 8.05c., New York, for carload and larger lots, with 8.55c. per lb. the maximum price for less than carloads. It is considered that these prices insure a fair profit.

Spelter.—The market has taken on a very firm and confident tone and is stronger and slightly higher. Some predict an advancing market. Large producers

and dealers are not offering any metal for any position. For September 9.25c., St. Louis, or 9.50c., New York, is bid and regarded as the nominal quotation for spot and early delivery, but there have not been many sales. For October delivery about 9.10c. is asked, while last quarter at 9c. to 9.05c., all St. Louis. The Government is about to close contracts for 6000 tons of the lower grade spelter for delivery in the last quarter. The weekly Government report of spelter output shows very little change in stocks.

Antimony.—There is very little demand and the market is lifeless at 14c., New York, duty paid, for prompt or early delivery.

Aluminum.—No. 1 virgin metal, 98 to 99 per cent pure, and scrap metal are sold at Government maximum prices. For 50-ton lots this is put at 33c. per lb.; for 15 to 50-ton lots, 33.10c. per lb. is the price and for 1 to 15-ton lots, 33.20c. per lb.

Old Metals.—Copper and lead are more active, but the rest of the items are quiet. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible.....	26.00
Copper, heavy and wire.....	25.00
Copper, light and bottoms.....	23.00
Brass, heavy.....	17.75
Brass, light.....	18.25
Heavy machine composition.....	23.50
No. 1 yellow rod brass turnings.....	14.75 to 15.25
No. 1 red brass or composition turnings.....	23.50
Lead, heavy.....	7.75
Lead, tea.....	6.50
Zinc.....	7.25

Chicago

SEPT. 9.—Copper continues in steady demand with all essential needs amply cared for. Tin is softer, and consumers are being freely supplied. Lead is very hard to procure and can only be had for Government work after proper application has been made. Spelter continues quiet but firm. For antimony there are occasional calls only. In general, the metal market is uninteresting. We quote copper at 26c. for carloads and 27.30c. for part carloads; tin, 86c. to 88c.; lead, nominal at 7.85c.; spelter, 9.50c. to 10c.; antimony, 15.50c. to 16c. On old metals we quote copper wire, crucible shapes, 22.50c.; copper clips, 21.75c.; copper bottoms, 21.50c.; red brass, 22.50c.; yellow brass, 15.50c.; lead pipe, 6.25c.; zinc, 5.75c.; pewter, No. 1, 45c.; tin foil, 50c., and block tin, 60c.

St. Louis

Sept. 9.—The market has been quiet with very little fluctuation in prices. Quotations on carload lots at the close to-day were as follows: Lead, 7.75c., but no orders accepted except on Government allotment; spelter, firmer and higher at 9c.; less than carloads, lead, 8.25c.; spelter, 9.75c.; tin, \$1.10; nominal; copper, 27.85c.; antimony, 16c. In the Joplin district, with a reduced demand for spelter, lower tonnages of tin blende were bought with the result that second grade sold at \$52.50 per ton, basis 60 per cent, with the weekly average \$57.50 per ton, the usual amount of the grade ore being disposed of to sheet zinc makers at \$75 per ton. Lead ore was firm at \$100 per ton, basis 80 per cent. Calamine was quiet at \$35 to \$40 per ton with the average for the week \$38 per ton. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 10c.; heavy yellow brass, 14c.; heavy red brass, 19.50c.; light copper, 18.50c.; heavy copper and copper wire, 20c.; pewter, 30c.; tin foil, 60c.; lead, 6c.; zinc, 5c.; tea lead, 5c.; aluminum, 20c.

The Government of India announces that recent investigations do not confirm the supposition that the resources of India, under existing war conditions, could economically be turned to account for the construction of cargo steamers for government use. The Government is, however, prepared to encourage the construction by private enterprise of such wooden sailing ships with or without auxiliary power, as can be readily built in India. The proposals to build ferroconcrete ships in India are to be held in abeyance for a few months.

IRON AND INDUSTRIAL STOCKS

GENERAL INDIFFERENCE

Government Absorption of Money and Action Taken to Limit Funds Available for Speculation Stops Upward Trend of Buying

NEW YORK, Sept. 10.

The rising market of last week, based on brilliant military successes in France, had but a short career and was immediately followed by a rather sharp decline. The action of the money committee of the Stock Exchange, working in conjunction with Federal Reserve authorities, in calling for a complete list of outstanding stock loan accounts showed that the more expansion of speculation on borrowed capital would be permitted during the stress of war financing. The step terminated some speculative pools but did not interfere with investment buying. It is plain that the entire investment field is now given over to the campaign for making the fourth Liberty Loan an unequalled success.

New offerings of corporate securities are reported to have fallen off and little open-market financing of industry is looked for until after the Government loan has been taken. A number of corporations are expected to take funds at that time. Financing by railroad and industrial companies during August amounted to \$89,500,000 as compared with \$185,900,000 a year ago. About three-quarters was in the form of short term notes. It is entertained that investment conditions will ease and permit refunding in long term securities. The buying up of money due to the large deposits of Sept. 1 interest payments was followed in a few days by a return of stringency due to heavy withdrawals on Government account and for use in moving crops. New incorporations for the past month are estimated at \$144,000,000 as against \$462,662,000 in August, 1917.

A week ago U. S. Steel common under the influence of the upward tendencies rose 4 points to 116, which, owing to the dividend, was a market value of over 120, but it followed the downward trend sharply and ended the week at 112 for a net gain of only 1/4 point. Changes for most steel and metal-working industries were of a similar small compass.

The range of prices in active iron and industrial stocks from Tuesday of last week to Wednesday of this week was as follows:

Chalm. com. 30 3/4 - 33 1/4	Int. Har. Corp. pf. 106 1/2
Chalm. pf. 83 3/4 - 84 1/4	Lackaw. Steel .. 81 1/4 - 86
Can. com. 44 1/4 - 47 1/8	Lake Supr. Corp. 17 1/4 - 18 1/4
Can. pf. 93 3/4 - 94	Midvale Steel .. 51 1/4 - 54 1/4
Car & Fu. 84 1/4 - 87 1/4	Nat.-Acme .. 31 1/4 - 31 1/4
Loco. com. 65 1/4 - 67 1/4	Nat. Enam. & Stm. com. 50 1/4 - 52 3/4
Radiator com. 24 1/2	N. Y. Air Brake. 121 - 125
Ship com. 130 - 133	Nova Scotia Steel 66 - 67
Ship pf. 87 1/4	Pittsb. Steel pf. 94
Steel Fdries. 79 1/4 - 83	Pressed Stl. com. 67 1/2 - 71 1/2
Loco. com. 86 1/4 - 95 1/4	Pressed Steel pf. 98 1/4
Loco pf. 101 3/4 - 102	Ry. Steel Spring com. 65 1/4 - 70
Steel com. 82 1/4 - 87	Republic com. 88 1/4 - 94 1/4
St. Cl. B. 82 1/4 - 87 1/4	Sloss com. 60
Pneu. Tool. 69 - 70 1/2	Sloss pf. 93
Fuel .. 45 1/4 - 49 1/4	Superior Steel .. 41 1/4 - 43 1/4
Steel com. 63 1/4 - 69 1/4	Un. Alloy Steel. 38 1/4 - 39
Steel pf. 91	U. S. Pipe com. 12 1/4 - 14
Electric .. 115 - 148 1/4	U. S. Pipe pf. 40 - 42 1/4
Or. Ore Cert. 21 1/4 - 33 1/4	U. S. Steel com. 107 1/4 - 115 1/4
States Steel. 83 - 87	U. S. Steel pf. 110 1/4 - 111
Har. of N. J. 126 - 127	Va. L. C. & Coke. 71 - 72
Har. Corp. 62 1/4 - 63 1/4	Warwick .. 8 1/4 - 8 1/4
	Westingh. Elec. 42 1/4 - 44 1/4

Dividends

- The Albia-Chalmers Mfg. Co., quarterly, 1 1/4 per cent on preferred and 3/4 per cent on account of accumulated dividends payable Oct. 15.
- The American Car & Foundry Co., quarterly, 2 per cent on common and 1 1/4 per cent on the preferred, payable Oct. 1.
- The American Steel Foundries, quarterly, 1 1/4 per cent and 1 1/4 per cent payable in the second 4 per cent Liberty loan, payable Sept. 30.
- The Canadian Crocker-Wheeler Co., quarterly, 1 1/4 per cent the common and preferred, payable Sept. 30.
- The La Belle Iron Works, quarterly, 1 per cent and extra 1 per cent on the common, and 2 per cent on the preferred, payable Sept. 30.
- The Otis Elevator Co., quarterly, 1 1/4 per cent on the common and 1 1/2 per cent on the preferred, payable Oct. 15.
- The Sloss-Sheffield Steel & Iron Co., quarterly, 1 1/4 per cent on the preferred, payable Oct. 1.

Great War Tax Bill Fails to Arouse Much Interest as Debate Proceeds

WASHINGTON, Sept. 10.—The eight-billion-dollar war tax bill has reached the debating stage in the House of Representatives, but it is no nearer its final passage.

It took Chairman Kitchin of the Ways and Means Committee two days of solid oratory to tell as many members of the House as could be induced to remain on the floor what the bill really meant. But even while he was at work on this explanation, some of the foundations of the bill began to crumble. The new prohibitions rules promulgated by the Food and Fuel Administrations as well as the prohibition rider which the Senate tacked on to the food production bill carved out a big slice of the promised revenue.

This deficit was estimated by Chairman Kitchin as approximating \$400,000,000 for the current fiscal year. Of this he hoped to salvage \$120,000,000 through the tax on beer already brewed. For the coming fiscal year, however, he promised a deficit of \$1,000,000,000 over the estimates for the revenue which the bill is to produce.

As the committee had already tapped all the sources of revenue which it could find, except through a consumption tax or through a new tariff revision, Mr. Kitchin did not appear enthusiastic over the outlook. Nor had he decided whether his committee should attempt to dig up new sources of revenue, or whether it should leave this troublesome task to the Senate Finance Committee.

As a matter of fact the problem will probably have to be left to the Senate anyhow. That body has begun hearings and declares that it will end them this week. If the debate in the House evidenced a listlessness, which seemed surprising for so important a measure, the Senate committee found an even more surprising indifference. For the first four days of its hearings, the committee had a difficult time getting witnesses to tell their views. Each day the session lasted only about an hour because the witness list was exhausted. And even then few of the witnesses seemed to be able to shed any light on the bill itself. Some of them seemed to think that they had come to Washington to deliver socialistic arguments on things in general.

Before the end of the week, the committee expects to be buried under an avalanche of witnesses. But all its efforts to induce people to come at the beginning of the week seem to be in vain.

Of the witnesses concerning whom the committee had advance notice, the testimony of Judge E. H. Lindley, general counsel of the Great Northern Railway, promised to be of the greatest interest to the iron and steel industry. He was scheduled to appear in behalf of the independent ore properties in the Lake Superior region to protest against the "invested capital" definitions of the House bill. It has been pointed out to the Senate committee that the present draft of the law would work a hardship on mine owners because it does not cover the depletion of the mines caused by their being worked. The mine owners demand that royalties be treated not as pure income on invested capital, but partly as an exhaustion of the capital itself. It is reported that there is danger of a shutdown of many of the independent Lake Superior mines if no relief is granted them from the drastic provisions of the war and excess profits taxes.

The Carnegie Steel Co., will build 30 to 40 houses for employees this year in the vicinity of the Ohio Works at Youngstown, Ohio. These houses, which will be built by the company's own construction department, will be largely fireproof and have from four to six rooms each.

The Penn-Mary Steel Co., Bethlehem, Pa., has filed notice of increase in indebtedness of \$900,000, or from \$73,000,000 to \$73,900,000, for extensions.

PERSONAL

Thomas W. Kennedy has resigned as president and general manager of the Adrian Furnace Co., DuBois, Pa., and is succeeded by Frank G. St. Clair, who has been vice-president. Mr. Kennedy retains his interest in the furnace company but retires from official connection to take a rest of a year for his health. He has been a prominent figure in the foundry iron trade for a number of years, becoming head of the Adrian Furnace Co. when it was organized 14 years ago. His company has also controlled for a number of years the Punxsutawney furnace at Punxsutawney, Pa.

Frank H. Crockard, former general manager of the Tennessee Coal, Iron & Railroad Co., and later president of the Nova Scotia Steel & Coal Co., has been named president of the Woodward Iron Co., vice A. H. Woodward, who becomes chairman of the board. Mr. Crockard and Mr. Woodward are in the East to attend a directors' meeting and then to see the Government officials in regard to the final decision in the matter of the steel works at the Woodward furnace plant. Vice-President Reginald Banister has been granted a year's leave of absence and General Manager John J. Shannon has resigned.

George M. Verity, president American Rolling Mill Co., Middletown, Ohio, has been selected to take charge of the Cincinnati district in the coming campaign to raise funds to carry on War Camp Community Service work.

Thomas McDonald, consulting engineer in the Youngstown, Ohio, district for the Carnegie Steel Co., has declined an appointment as manufacturers' representative on the advisory committee of the Youngstown community labor board owing to the urgent demands on his time by his company.

C. B. Cushwa, who recently resigned as district manager of the Sharon Steel Hoop Co., Sharon, Pa., and superintendent of its Haselton works at Haselton, Ohio, was presented a diamond ring by his former associates.

J. L. Replogle, Director of Steel Supply, will shortly visit Youngstown, Ohio, to make a number of addresses to workmen in the steel mills and other manufacturing plants in the Youngstown district. Frank Purnell, formerly in the sales department of the Youngstown Sheet & Tube Co., now at Washington, expects to accompany him to Youngstown.

Edward A. Phelan has resigned as superintendent of the sheet mill department of the Sharon Steel Hoop Co. at Haselton, Ohio, effective Sept. 14.

Herman B. Furlong, for some years adjuster of claims for the McClintic-Marshall Co., Pittsburgh, has been commissioned a captain in the Quartermaster's department. He was the first man of that organization to go to the Panama Canal, where the company had important work, and was the last man of the company to come back.

Thomas W. Kennedy, son of Julian Kennedy, consulting engineer, Bessemer Building, Pittsburgh, was severely injured, and his wife was instantly killed in an automobile accident in Jersey City, N. J., on Saturday night when their car was struck by an Erie Railroad train. Hopes are entertained for the recovery of Mr. Kennedy, but his condition is critical.

George J. Long, vice-president and director of the United States Cast Iron Pipe & Foundry Co., and manager of its Louisville plant, suffered a stroke of apoplexy on Sept. 3, and is in a serious condition at his home, "Bashford Manor," near Louisville, but is expected to recover.

J. W. Wellington has been made general manager of the Dauch Mfg. Co., Sandusky, Ohio, builder of tractors. L. E. Willson has been appointed general sales manager.

Roger P. Redier has been appointed general sales manager for the Allied Machinery Co. of America, with headquarters in Paris, France. He has had long ex-

perience in selling American machinery throughout Continental Europe. He is now in the United States visiting the company's factories and expects to return to France this fall.

P. J. Phillips of the Federal Export Corporation, Broadway, New York, returned last week from a months trip through Central America, Peru, Ecuador, Colombia, Venezuela and the Caribbean district. While in Panama Mr. Phillips took an active part in the Liberty Loan and W. S. S. drives, which he states were enthusiastically supported. In all the countries throughout his trip he found sentiment for the United States most cordial and demand for American manufactures strong.

Col. Jay E. Hoffer, commandant United States Armory, Springfield, Mass., has received orders to proceed at once for duty overseas. Col. Hoffer has been in command of the Springfield Armory since March 1917. He has had a broad industrial experience, having been for three years at Frankford Arsenal, Philadelphia, and for four years, 1903-1906, at the Springfield Arsenal. After a short tour of duty as inspector of ordnance in the Pittsburgh district, he spent four years in charge of the gun division of the ordnance office in Washington. Later he was stationed at the San Francisco Arsenal. In 1915, for the second time, he took charge of the gun division of the ordnance office, which grew from a staff of ten officers and clerks in 1915 to a staff of over 4000 in 1918, when Col. Hoffer gave up his position on account of ill health due to overwork.

John D. W. Snowden has arrived in Rio de Janeiro, Brazil, where he will represent the American Steel Export Co., New York.

H. E. Henry has been appointed general sales manager of the Fulflo Pump Co., succeeding A. N. Mather, who has accepted a position with the Pyle National Co., Chicago. Mr. Henry has been associated in the capacity of purchasing agent with the Fulflo Pump Co. since the business was established. He will also continue to act as purchasing agent for the present.

John Guyer of the erecting staff, Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., has left for France to install 20 overhead electric cranes in the factory of Automobil Berliet, Lyons, France.

W. E. Williams, Braden Mfg. Co., has been elected president of the Terre Haute Manufacturers' Association, Terre Haute, Ind., and L. M. Eyke, Terre Haute Malleable Co., vice-president.

William Stegeman, Milwaukee, who recently resigned as works manager of the Stegeman Motor Co., now the Parker Motor Truck Co., Milwaukee, has become associated with the sales department of the M. J. Walsh Machinery Co., 144 Sycamore Street, Milwaukee, dealer in new and used machine tools and factory equipment.

W. C. Bird, formerly chief clerk of the American Steel & Wire Co., Waukegan Works, Waukegan, Ill., has been transferred to the office of the auditor in Cleveland. C. M. Diehl, formerly chief clerk at the Donora, Pa., Wire Works, succeeds Mr. Bird at Waukegan. D. M. Stinson, formerly chief clerk at the Allentown, Pa., Works, succeeds Mr. Diehl. J. B. McClure, formerly general clerk in the accounting department in the Donora Wire Works, succeeds Mr. Stinson at Allentown.

J. H. Nutt, secretary of the Western Bar Iron Manufacturers' Association, and John Williams, secretary of the Amalgamated Association of Iron and Steel Workers, have gone to the Pacific Coast to adjust some labor troubles in iron and steel works there.

John Hughes, assistant to president United States Steel Corporation, who went to London early in August as a member of the party headed by L. L. Summers of the War Industries Board, has participated in recent sittings of the so-called Inter-Allied Tin Executive Committee, referred to in advices from London in the past week. George M. Armsby, chief of the tin section, War Industries Board, is the other American representative in the London sessions. The committee in London is dealing with the purchase and distribution of tin in the interest of the Allied countries.

COKE OF BETTER QUALITY

Steps Taken by Fuel Administration—An \$80,000 Refund for Inferior Coke

WASHINGTON, Sept. 10.—The Fuel Administration has taken vigorous steps to enforce an improvement in the quality of coke which is being produced. It has instituted a system of increased inspection for the entire coke industry, and has begun operations by forcing one coke company to refund \$80,000 to two furnace companies which were damaged by the delivery of inferior coke. The new inspection system will be headed by R. C. Glazier, Johnstown, Pa., as chief coke inspector of the Coke Bureau.

"The object of the institution of the inspection section," says the announcement of the Fuel Administration, "is to centralize further the work for improvement in the quality of coke, to conserve fuel and to increase production in the interest of enlarged production of iron and steel. The chief inspector will enlarge the present field force for the systematic inspection of the product of the ovens both at producing and delivery points. With the vastly increased demand for coke there has arisen a tendency to speed production to a point where quality became a secondary consideration. The necessity of keeping the standard of quality high without shortening the quantity, has made it advisable to exert systematic efforts to that end."

Refund to Two Furnace Companies

The coke producing company which is making the \$80,000 refund is the Consolidated Coke Co. of Pittsburgh. The furnace companies who are to receive this payment are the Steel Company of Canada, Hamilton, Ont., and the Thomas Iron Co., Hokendauqua, Pa.

"The Consolidated Coke Co.," read the statement of the Fuel Administration, "had contracts providing for the delivery of coke made from washed coal to the blast furnaces of the other two companies. Last November the Consolidated Coke Co. washery broke down and shortly thereafter burned, rendering the producers unable to ship coke of the quality contracted. Also, in order to secure maximum output the coke company had installed coke-drawing machines which enabled them to maintain the regular output of coke, but, as appeared, reacted unfavorably on the quality of coke produced. It was clearly evident to the Fuel Administration that both the iron companies had been seriously damaged, not only by increased fuel consumption but also had been unable to meet the requirements for metal of their respective governments."

"The Consolidated Coke Co. agreed to pay each of the other companies a sum amounting to \$1 per ton for each ton of coke shipped to them from June 1 to Aug. 15. Also it agreed to rebuild its washery at the earliest possible date. The sum involved, while large, in no way represents the loss sustained by the furnace companies and, of course, the national loss due to the curtailed tonnage of iron and steel cannot be calculated in dollars and cents. It is the belief of the administration that the exercise of its power to maintain the standard of quality of coke, by control of prices, will result in more vigorous efforts on the part of all coke producers to use their properties to the utmost extent to aid in the effective prosecution of the war."

Slight Increase in Coke Output

According to the report of the Geological Survey the production of beehive coke in the United States during the week ending Aug. 31 was estimated at 617,000 net tons as compared with 592,000 net tons during the week of Aug. 24, an increase of slightly over 3 per cent. Operators in the Connellsville, Greensburg and Latrobe districts of Pennsylvania report production of beehive coke during the week ended Aug. 31 at 381,977 net tons and an operation of their plants at 75.1 per cent of full time, as against 74.6 per cent during the week preceding. According to the same report the output of by-product coke during the week ending Aug. 31 totaled 551,030 tons, against an output of 546,058

tons in the preceding week. This represented an output of 90.1 per cent of the maximum capacity of these plants.

The bituminous coal output of the United States has become more stable than during the earlier weeks of the summer, according to the figures of the Geological Survey. For the week ending Aug. 31 the estimated production was 12,642,000 tons, including lignite and coal coked, against 12,620,000 net tons during the preceding week.

Chrome Ore Output and Supplies

WASHINGTON, Sept. 10.—The U. S. Geological Survey has issued its annual report on the chromite industry for 1917. The domestic production, so far as may be judged from reports received, says the bulletin, was 43,725 gross tons. It came mainly from California, where the output was more than 36,700 tons. Alaska produced nearly 1000 tons, and the remainder came mostly from the States of Washington, Maryland and North Carolina.

On account of the greater war demands it has been estimated by the committee on mineral imports and exports of the Shipping and War Trade Boards that the needs of the United States in 1918 will be equivalent to about 130,000 gross tons of 50 per cent ore, of which 67,500 tons will be needed for ferrochrome, 40,000 tons for making bichromates and other chemicals for tanning, etc., and 22,500 tons for refractory purposes.

Under the impulse of a great need and the favorable opportunity offered to arouse miners to strenuous efforts it is hoped and expected that the production of chrome ore in the United States in 1918 will be as much as 65,000 tons of all grades. This output would be equivalent to 47,700 tons of 50 per cent ore.

To this may be added 1000 tons from Alaska, 25,000 tons of low-grade ore from Canada, with some from Newfoundland, as well as about 30,000 tons from Cuba, Brazil and Guatemala, and there would remain more than 40,000 tons of various grades to be imported from New Caledonia and Greece.

Steel Corporation Orders Decline Again

Unfilled orders on the books of the U. S. Steel Corporation on Aug. 31 were 8,759,042 tons, as compared with 8,883,801 tons on July 31. This is a falling off of 124,759 tons. A year ago the unfilled orders were 10,407,049 tons. There has been but one increase in orders this year and that was in June, when it was over 500,000 tons. The table below gives the unfilled tonnage for the Steel Corporation at the close of each month beginning with January, 1915.

	1918	1917	1916	1915
January	9,477,853	11,474,054	7,922,767	4,248,571
February	9,288,453	11,576,697	8,568,966	4,345,371
March	9,056,404	11,711,644	9,331,001	4,255,749
April	8,741,882	12,183,083	9,829,551	4,162,244
May	8,337,623	11,886,591	9,937,798	4,264,598
June	8,918,866	11,383,287	9,640,458	4,678,196
July	8,883,801	10,844,164	9,593,592	4,928,640
August	8,759,042	10,407,049	9,660,357	4,908,445
September		9,833,477	9,522,584	5,317,618
October		9,609,675	10,015,260	6,165,452
November		8,897,106	11,058,542	7,189,489
December		9,381,718	11,547,286	7,806,220

Reported Killed in Action

According to a letter received from another soldier, Heath E. Noble, first lieutenant, Company I, 168th Infantry, was killed in action early in August somewhere in France. Lieutenant Noble before joining the colors was a clerk in the office of Rogers, Brown & Co., New York, and was 22 years of age. Although the death of the young soldier has not been reported by General Pershing, it is feared that the report contained in his friend's letter is true.

The new blast furnace No. 1 at the Steelton, Pa., works of the Bethlehem Steel Co., which has been in course of construction for some months past, is now nearing completion and will be placed in operation at an early date.

Pittsburgh and Nearby Districts

The Union Switch & Signal Co., Pittsburgh, an interest of the Westinghouse Air Brake Co., is buying some machine tools preparatory to increasing its output of Lehrne airplane motors.

Chester & Fleming, engineers, Pittsburgh, has received a contract from the Government for the building of an artillery cantonment at Stithton, about 30 miles south of Louisville, Ky., on the Illinois Central Railroad. The cantonment will be 17 miles long, and seven miles wide, and will be equipped with a 14-mile artillery range. The cantonment will accommodate six brigades of heavy and light artillery of 11,000 men each. Work has been started.

The Ordnance Department, United States Steel Corporation, is trying to get, with the assistance of the United States Employment Service, about 3000 skilled laborers for the gun and projectile plant being built on Neville Island. Active work is now going on at this plant, and about 1000 men are employed, but three or four times that number are badly needed.

It is understood that the crane equipment list for the Neville Island plant of the United States Steel Corporation includes 48 10-ton overhead traveling cranes, and that these will be placed shortly in lots of eight. The contracts are likely to be divided among a number of crane builders.

Last week Charles Zeublin of the United States Department of Labor delivered an address before the Pittsburgh Chamber of Commerce in that city, in which he stated that from 20,000 to 40,000 skilled workmen are badly needed in the industry plants in the Pittsburgh district. He read a telegram from Washington stating that the Government is planning to send upward of 30,000 men to the Pittsburgh district to meet the shortage. Mr. Zeublin further said that about 90 to 95 per cent of all the industries in the Pittsburgh district are working on strictly Government work.

The Carnegie Steel Co. is now operating three batteries each containing 128 Koppers by-product coke ovens at its Clairton, Pa., plant; the fourth battery of the same number will likely be ready for operation in about 60 days, and a fifth later in the year, so that by Jan. 1 the company expects to have 640 Koppers ovens in operation. A full output of coke is not being made at the 384 ovens in operation, owing to the short supply of coal. On account of the pressing demand made on the Carnegie Steel Co. for war materials, it has not been able to build the barges ordered some time ago for hauling coal from its mines up the Monongahela river to the Clairton plant, and the plant has had to depend largely on rail shipments of coal. The three blast furnaces of the Carnegie Steel Co. at Clairton are being operated entirely on by-product coke made at the Clairton plant, and there is a small surplus for other blast furnaces of the company.

The first of the fall and winter meetings of the Pittsburgh Foundrymen's Association will be held in the rooms of the Americus Club in that city on Monday evening, Sept. 16. Commodore R. D. Denig, inspector of engineering materials for the United States Navy, will address the meeting on the subject of castings as required for use by the Navy. J. Lloyd Uhler, the new president of the association, will preside. Bayard Phillips has been elected secretary to succeed Frank H. Zimmers, who died about a year ago.

E. K. Morse, transit commissioner of Pittsburgh, has suggested to the mayor of that city that citizens be asked to gather their scrap iron and steel, and dump it into a public heap, and thus help to reduce the commercial scarcity of old iron and steel. The matter is under consideration.

George Blackmore of Pittsburgh, and W. E. Clark of West Newton, Pa., are interested in a company which proposes to build a new plant at West Newton, Pa., for the manufacture of pipe nipples.

The H. Koppers Co., Pittsburgh, will rebuild for the Algoma Steel Co., Sault Ste. Marie, Ont., Canada,

one battery of 55 of its first installation of by-product coke ovens.

The Chas. T. Topping Machinery Co. announces that it has merged its interests with the Pittsburgh office of the Lakewood Engineering Co., Cleveland, manufacturer of construction plant and industrial haulage. The office is at 411 Fulton Building, Pittsburgh.

Companies in the Pittsburgh district making strictly war essentials are to have their fuel needs largely taken care of by a special branch of the National Fuel Administration just established in that city. This is known as the fuel branch of the Quartermaster General's Fuel and Forage Division, but is allied with the Fuel Administration and is to be housed with that organization in the Chamber of Commerce Building, Pittsburgh. The branch will be in charge of Capt. C. F. Ingold, a furloughed member of the Pennsylvania Railroad staff. The fuel branch's orders to see "that all ordnance contractors, aircraft contractors and all other branches of the United States army are supplied with fuel" covers the supplying not merely of coal, but of coke, fuel oil and supplies of a similar nature. It had been the practice for the various branches of the army and manufacturers of Government materials to appeal, through the fuel and forage divisions at Washington, for assistance when hard pressed for fuel. It had also been the custom for the Washington authorities to present the matter to the attention of the Fuel Administration. This new move in creating a local branch of the fuel and forage, and then allying it directly with the Fuel Administration, is intended to eliminate the needless delays in this procedure.

Manganese Ore in Colorado

Colorado ranked seventh in 1917 among the states producing the bulk of that year's domestic output of manganese ore. A. H. Hubbell in an article in the *Engineering and Mining Journal*, Aug. 31, says:

"Much of the State's output comes from the manganese-silver ores of the Leadville district. Metallurgical or 40 per cent manganese ore is rare in Leadville, though 30 per cent ore exists in large quantities. The U. S. Geological Survey has recently estimated that 13 deposits in the district named contain about 700,000 tons and possibly 1,500,000 tons of ore averaging 20 to 25 per cent Mn, 24 to 30 per cent Fe, and 10 to 15 per cent SiO₂. Similarly at Red Cliff, Col., two deposits are estimated to have probably 750,000 tons and possibly 1,000,000 tons of ore analyzing 14 per cent Mn, 38 per cent Fe, and 1 to 2 per cent SiO₂, all these ores being low in phosphorus. Tests are being made at the Golden station of the U. S. Bureau of Mines on manganese-silver ores with the Caron process, which recovers the silver by leaching and precipitation and the manganese as a by-product. This work is under the supervision of George H. Clevenger, and is being done for the Bureau of Mines, the Netherlands Government and the Research Corporation of New York. The Golden station was selected because of the large bodies of the manganese-silver ores occurring in Colorado."

The statement was made in THE IRON AGE of Aug. 29 that "at no time thus far has any electric steel producer or other user of electrodes been obliged to shut down because of inability to obtain electrodes." This was printed after inquiry had been made in many directions for facts bearing on the suggestion coming from Washington that further installations of electric furnaces might be held up because of electrode shortage. The statement must be modified in view of information that the Iron Mountain Alloy Co. at Utah Junction, Col., operating on ferromanganese, had been compelled to shut down three times in two months because of failure to obtain electrodes. The difficulty of obtaining electrodes is well-known and THE IRON AGE has been informed of frequent shipments by express in order to prevent shutdowns, but apart from the instance mentioned has not known of actual suspensions for lack of electrodes.

SEMI-STEEL SHELLS NEEDED

Meeting in Pittsburgh Considers Plans for Helping the Government

PITTSBURGH, Sept. 11.—Last week a meeting of 100 more operators of gray-iron foundries, and also a few makers of steel castings, all their plants being embraced in what is known as the Pittsburgh War Resources Region No. 5, held a meeting in the Chamber of Commerce Auditorium in that city for the purpose of finding out how many foundries in the Pittsburgh region would take up the manufacture of semi-steel shells. Major Custer of the Ordnance Department, Pittsburgh, was present and gave considerable information as to the needs of the Government for shells.

The War Industries Board is importuning the iron and steel foundries to install the necessary equipment for the manufacture of semi-steel shells, the additional requirements of the Government, beyond orders already placed, being given as 20,000,000 shells.

Under date of Sept. 3 the War Industries Board at Washington sent out advices in part as follows:

The General Staff of the Army will shortly complete their figures on the new program of shell requirements. We have been informed in a general way what this is going to be. The purpose of this letter is to give you advance information to permit you to look into the question of locating sources of supply. The requirements will be quite large, and necessitate our going into this matter very carefully so that we may be informed of the best sources of production available. Sources must be created for the production of the following sizes and types of shells:

155 MM. SHRAPNEL

A new plant is suggested for this having a capacity of 100 shells per day, both forging and machining. This is a new operation and will require a very good organization.

155 MM. HIGH EXPLOSIVES

The additional requirements in this shell are approximately 35,000 per day. It is contemplated placing contracts with manufacturers who could turn out a minimum of 100 per day, except that possibly in a few cases contracts for 500 a day will be placed with exceptionally good organizations.

75 MM. HIGH EXPLOSIVES

The additional requirements in this shell will be approximately 80,000 per day. These shells can be made with more or less standard equipment, and it is our view that these can be taken care of without requiring many new facilities, if any. A careful survey of existing facilities should be made to determine this.

12-IN. HIGH EXPLOSIVE SHELLS.

The new requirements for this size shell will be approximately 1500 per day. It has been difficult to find suitable sources of supply for this size shell and every effort should be made to find a good organization who could take hold of the work.

Foundries in Pittsburgh Region No. 5 which are willing to undertake any part of the above work are asked to communicate at once with Robert Garland, business manager, Chamber of Commerce Building, Pittsburgh.

As a result of the above meeting 31 foundry operators from the Pittsburgh district visited on Thursday, Sept. 5, the plant of the American Radiator Co., Buffalo, in order to gather ideas as to what equipment is needed for the manufacture of semi-steel shells. That company recently installed equipment, and is now turning out about 100 6-in. shells per day, and will soon very largely increase this output. Another meeting of the iron and steel foundry operators in the Pittsburgh district has been called for Wednesday, Sept. 11, at 10:45 a. m., and at this meeting, to be held in the Chamber of Commerce Building, some of the foundrymen who went to Buffalo will make verbal reports of what they saw there, and will also give their ideas as to what equipment is necessary to install for the manufacture of semi-steel shells. It is said there are a number of small foundries in the Pittsburgh district that are not busy that could install the needed equipment for making shells, also a number of small machine shops that by adding some equipment could machine these shells. At

the meeting to-day reports are to be made of just what Pittsburgh foundries can probably do in the way of helping out the Government.

Metal Industries at Chemical Exposition

A program of papers and motion pictures of interesting industrial operations has been arranged for each day in the week of Sept. 23 to 30 at the Fourth National Exposition of Chemical Industries at the Grand Central Palace, New York. The papers are confined to the afternoon sessions and the motion pictures to the evening.

On Wednesday afternoon, Sept. 25, the subject will be potash and among the addresses is one by Lynn Bradley of the Research Corporation, New York, on "Recovery of Potash from Iron Blast Furnaces and Cement Kilns by Electrical Precipitation." A motion picture of this will be presented in the evening. On Thursday evening S. C. Linberger will discuss "Carborundum Refractories."

Friday afternoon, Sept. 27, is devoted to the metal industries. Leonard Waldo will discuss "Development of the Magnesium Industry;" Alcan Hirsch will talk on "Ferrocement Pyrophoric Alloys;" Theodore Swann will speak on "Ferromanganese" and Prof. Joseph W. Richards will discuss "Ferroalloys of Silicon, Tungsten, Uranium, Vanadium, Molybdenum and Titanium."

Certain films will be shown each evening among which are one on the "Manufacture of Zinc Oxide," prepared by the New Jersey Zinc Co.; "Manufacture of Genuine Wrought Iron Pipe," A. M. Byers & Co., Pittsburgh; and the "Operation of a By-Product Coke Plant," H. Koppers Co., Pittsburgh.

The taking over of the Grand Central Palace by the Government on Sept. 1 will not interfere with the exposition, it is officially stated.

Cayuga Tool Steel Plant Sold

The properties of the Cayuga Tool Steel Co., Auburn, N. Y., have been purchased by R. A. Uihlein, Milwaukee, Wis., for \$165,000. The new owner will operate the plant as the Auburn Electric Steel Corporation. Plans are laid for the addition of an electric furnace room, 60 x 85 ft., to be erected on the north end of the hammer shop. This will house a 3-ton Moore three-phase basic electric furnace for making ingots. An office building and laboratory will be built at the south end of the rolling mill, and the lathe room that now stands on the site will be torn down and the lathes moved into the machine shop already erected across the tracks.

The gas fired crucible furnace plant that had been begun by the former management will probably be done away with. There will be no interruption of the work that has been going on in a small way under the direction of the receivers. Enough raw material is on hand to keep the hammers and the one set of 14-in. rolls going until the electric furnaces can be installed which will be about the last of the year. The 8-in. rolls which were partially installed last year will be completed as quickly as possible.

Finishing machinery will be installed. All grades of tool, high-speed steel and alloy steels in bars, die-blocks and forgings will be produced. The present operating force will be retained. When the mill is at full capacity it will employ from 400 to 500 men.

The Austin Co., Cleveland, has recently taken the following contracts for factory buildings: American Locomotive Co., 50 x 122 ft. to be erected in Pittsburgh; American Car & Foundry Co., Milton, Pa., 83 x 100 ft.; Curtiss Aeroplane Co., Buffalo, N. Y., 50 x 100 ft.; Barber Asphalt Paving Co., Madison, Ill., 100 x 160 ft.; John Simmons Co., 80 x 200 ft.; Columbia Machine & Malleable Iron Co., Brooklyn, N. Y., 80 x 160 ft.; Semet-Solvay Co., Syracuse, N. Y., 100 x 200 ft.; National Aniline & Chemical Co., Marcus Hook, Pa., 106 x 196 ft.; laboratory for Navy Department at Indian Head, Md., 32 x 63 ft.

FOREIGN COMMERCE

Exports of Iron and Steel Increased in July Over Preceding Month

Exports of iron and steel for July, 1918, totalled 457,233 gross tons, compared with 349,649 gross tons in July, 1917. Among the items showing an increase were wire rods, steel bars, billets, ingots and blooms, etc., wrought pipe and fittings, steel rails, plates, sheets, structural steel, tin and terne plates and barb wire. It is noteworthy that not a ton of scrap iron or steel was exported in July, although 22,516 gross tons went out in June. The total exports for the seven months of the year ended July 31 were 3,157,937, compared with 3,742,885 in the corresponding period of 1917.

Imports of Iron and Steel

	July		Seven Months	
	1917 Gross Tons	1918 Gross Tons	1917 Gross Tons	1918 Gross Tons
Ferromanganese	2,037	3,952	32,633	22,426
Ferrosilicon	702	353	6,233	1,563
All other pig iron	2,933	.....	10,453	1,953
Scrap	31,107	2,685	150,576	26,327
Bar iron	968	97	1,503	988
Structural iron and steel	1,128	8	1,681	1,627
Hoop and band iron .....	.....	.....	.....	.....
Steel billets without al-	.....	.....	.....	.....
loys	5,742	324	20,029	18,057
All other steel billets ..	1,232	471	4,248	4,663
Steel rails	579	539	4,321	3,403
Sheets and plates	263	61	1,100	1,249
Tin and terne plates ..	671	.....	115	32
Tin scrap .....	.....	478	.....	3,552
Wire rods	168	105	193	5,852
Total	28,859	9,073	233,085	91,692
Manganese, ore and ox-	.....	.....	.....	.....
ide of	53,437	29,886	370,227	274,722

Imports of iron and steel for July totalled only 9073 gross tons, compared with 28,859 tons the same month last year. Imports of ferromanganese totalled 3952 in July and of scrap 2685 gross tons, while in all other items the imports were relatively small, the total of structural iron and steel, for example, being only eight tons. The total importations in the first seven months of the year were 91,692 gross tons, compared with 233,085 during the same period in 1917.

Our exports of machinery for July showed a sub-

Exports of Machinery

	July		Seven Months	
	1917	1918	1917	1918
Adding machines	\$194,860	\$108,923	\$1,332,671	\$986,881
Air-compressing machinery	45,331	244,932	591,541	1,000,892
Brewers' machinery	11,417	12,015	72,358	82,372
Cash registers	32,090	41,867	586,933	301,731
Parts of	10,572	13,522	51,927	58,772
Concrete mixers	14,365	36,735	14,365	197,000
Cotton gins	11,274	5,180	61,367	74,331
Cream separators	51,100	60,775	428,568	474,744
Elevators and elevator machinery	105,728	152,888	1,317,935	994,130
Electric locomotives	21,961	3,495	293,692	66,761
Gas engines, stationary	65,881	60,542	588,941	276,180
Gasoline engines	1,459,909	2,349,154	13,843,789	22,071,700
Kerosene engines	208,197	511,823	208,197	4,660,881
Steam engines	2,622,340	1,957,587	15,420,458	20,271,000
All other engines	117,688	573,377	2,842,622	2,627,500
Parts of .....	.....	.....	.....	.....
Boilers	211,754	976,438	211,754	2,434,560
Boiler tubes	481,538	478,202	481,538	3,077,130
All other parts of engines	867,050	2,443,256	867,050	13,648,080
Excavating machinery	26,683	83,700	26,683	888,597
Milling machinery, flour and grist	29,971	141,187	481,683	266,000
Laundry machinery, power	23,511	31,167	268,084	145,211
All other	10,039	20,873	143,720	122,440
Lawn mowers	22,146	21,524	137,626	.....
Metal-working machinery (including wood-working tools) .....	.....	.....	.....	.....
Lathes	1,559,834	968,553	1,559,834	6,450,000
Other machine tools	769,435	815,919	769,435	4,471,900
Sharpening and grinding machines	442,042	601,592	442,042	3,878,200
All other metal-working machinery	1,929,328	2,456,620	1,929,328	14,445,000
Meters, gas and water	53,618	18,843	297,081	1,118,000
Mining machinery, oil well	86,342	155,623	795,847	5,349,310
All other	616,005	561,623	6,359,970	979,780
Paper-mill machinery	187,898	169,322	1,083,432	706,683
Printing presses	74,119	112,149	925,439	3,518,840
Pumps and pumping machinery	454,902	465,378	3,513,627	707,500
Refrigerating and ice-making machinery	125,471	66,319	660,625	246,000
Road-making machinery	30,051	88,703	30,051	4,300,700
Sewing machines	869,683	889,936	4,623,733	742,019
Shoe machinery	155,248	117,353	924,007	4,531,850
Sugar-mill machinery	359,559	769,328	3,833,619	3,807,900
Textile machinery	230,511	691,815	1,898,385	711,710
Typesetting machines	58,648	79,780	686,282	4,218,140
Typewriting machines	705,389	641,471	6,179,118	426,010
Windmills	141,097	78,340	637,408	572,870
Wood-working machinery, saw mill	135,180	128,398	349,986	557,540
All other	120,813	69,534	653,563	23,651,420
All other machinery and parts of	2,457,941	3,807,761	24,056,764	.....
Total	\$18,208,429	\$24,083,300	\$156,334,172	\$163,665,010

Exports of Iron and Steel

	July		Seven Months	
	1917 Gross Tons	1918 Gross Tons	1917 Gross Tons	1918 Gross Tons
Pig iron .....	.....	.....	375,687	.....
Ferromanganese	629	351	629	2,800
Ferrosilicon	2,067	483	2,067	2,200
All other pig iron	29,672	19,431	29,672	117,000
Scrap	3,196	.....	127,948	1,600
Bar iron	3,438	3,527	34,156	28,120
Wire rods	8,503	11,045	79,059	86,200
Steel bars	32,109	42,841	374,391	371,300
Billets, ingots and blooms, n.e.s.	112,085	139,612	1,142,032	1,122,000
Bolts and nuts	2,833	2,346	17,556	14,800
Hoops and bands	5,092	5,135	31,961	31,900
Horseshoes	154	109	1,619	2,100
Cut nails	197	195	1,926	2,600
Wire nails	7,157	7,688	53,869	49,400
All other nails, includ-	.....	.....	.....	.....
ing tacks	912	1,404	980	6,200
Cast-iron pipes and fit-	.....	.....	.....	.....
tings	7,328	7,544	42,119	42,450
Wrought pipes and fit-	.....	.....	.....	.....
tings	7,132	10,167	74,703	52,300
Radiators and cast-iron	.....	.....	.....	.....
house-heating boilers ..	461	227	3,829	1,200
Railroad spikes	1,006	702	11,945	5,000
Steel rails	19,704	27,358	315,237	239,700
Galvanized iron sheets	.....	.....	.....	.....
and plates	5,157	6,423	50,148	44,500
All other iron sheets	.....	.....	.....	.....
and plates	3,964	4,068	33,638	26,300
Steel plates	36,269	55,371	305,691	279,200
Steel sheets	9,931	15,175	82,048	106,700
Ship and tank plates,	.....	.....	.....	.....
punched and shaped ..	1,417	4,467	1,417	20,000
Structural iron and steel	14,633	19,215	181,888	132,700
Tin and terne plates ..	16,719	28,812	145,142	174,400
Barb wire	14,544	27,646	104,097	109,600
All other wire	12,889	15,891	116,959	88,900
Total	349,649	457,233	3,742,885	3,157,937

stantial increase, totalling in value \$28,083,300, compared with \$18,208,429 in the same month last year and with \$21,083,962 in June of this year.

Details of the imports and exports for July are given in the accompanying tables.

The membership gain of the National Safety Council for the year ended July 31 was 306, according to the fifth annual report of W. H. Cameron, general manager prepared for presentation at the annual meeting to be held at St. Louis in the week of Sept. 16. The present membership is 3606 and there are 47 local councils, a gain of 14 in the year. The council has invested \$12,000 in Liberty bonds.

Large Output of Fluorspar

WASHINGTON, Sept. 10.—The domestic output of fluorspar made great strides in 1917, but threatens to remain stationary this year, according to statistics of the industry just made public by the U. S. Geological Survey.

The shipments of spar from the mines in 1917 were 288 net tons, valued at \$2,287,722, an average price of \$10.45 a ton, compared with 155,735 tons, valued at \$922,654, or \$5.92 a ton, in 1916, an increase in quantity of 40.5 per cent and in value of nearly 148 per cent. The quantity of crude fluorspar mined in the United States in 1917 reached a total of 280,825 tons, compared with 175,165 tons in 1916, an increase of more than 60 per cent. The stocks of marketable spar on hand at the end of 1917 amounted to 21,655 tons, compared with 3666 tons at the end of 1916, but a considerable part of this stock was under contract, awaiting cars, boats, or weather favorable for shipment.

For 1918, the estimates promise an output of 218,000 tons, practically the same as last year. This is considerably less than it might be if sufficient labor, machinery and other supplies were available. The shipments for the first half of 1918 are estimated at approximately 108,000 tons, and there were about 10,560 tons of spar in stock at the mines, only about 2000 tons of which had not been sold or contracted for on April 1, 1918.

Imports of fluorspar in 1917 increased slightly in quantity, but greatly in value, 13,616 tons, valued at \$8.42 a ton, having been imported last year, compared with 12,323 tons, valued at \$4.38 a ton, in 1916.

Swedish Steel and Iron Output

The Swedish output of iron and steel for the first quarter of 1918 was 206,600 metric tons of pig iron, 112,300 tons of open-hearth ingots and 84,800 tons of rolled and hammered iron and steel. These figures vary but little from those for the same quarter in 1917. The output of crucible and electric ingots was 2200 tons to April 1, 1918, the data previous to that not having been separately given.

Of the existing 139 blast furnaces, 108 were operating on March 31 this year; of the 241 Lancashire furnaces, 150 were then operating; of the 24 Bessemer converters, 7 were in operation, and of the 87 open-hearth furnaces, 56 were making steel at the close of the first quarter.

Large Order for Rifles

The Victor Talking Machine Co., Camden, N. J., has secured a contract from the War Department for the manufacture of 1,000,000 rifles of the Enfield type at an aggregate price said to be about \$19,000,000. The company will make changes in certain machinery to meet this order and plans to rush production. With the contract, the works will be placed on a basis of 75 per cent of output for war work, having recently been devoting about 40 per cent of the plant capacity to the manufacture of hydroplane parts for naval aerial service. It is understood that production of these parts will also be continued.

Three electric furnaces are being installed at Beauport, some 23 miles below Quebec, for the manufacture of ferro-silicon and ferro-titanium. The power will be secured from the plant of the Laurentian Power Co., St. Fereol, on the St. Anne River.

The Texas Steel Co., Beaumont, Texas, began last week to mine coal in Alabama for the production of coke for its blast furnace at Rusk, Texas. It is probable that 60 to 90 days will elapse before the furnace can be blown in.

Production of Submarine Mines

WASHINGTON, Sept. 10.—Production of submarine mines by the Navy Bureau of Ordnance has been so highly developed that 1000 mines are now made daily. If all the mines produced since America entered the war were planted at the distance maintained between mines in mining operations at sea, the mine belt would cross the Atlantic eight times. The safety of the mine is evidenced by the fact that there has not been an explosion or accident either loading or laying. Should a mine break adrift from its anchor, it is rendered inactive by an internal mechanism, and should a ship strike it the firing mechanism would not function.

To obtain these mines in such numerous quantities, as well as to preserve secrecy regarding their characteristics, a departure from usual manufacturing methods was adopted. It was impracticable to develop a great plant for the sole purpose of manufacturing mines, since there was not sufficient time. The expedient was, therefore, adopted of dividing the mine into many parts and having these manufactured at different commercial plants, all the parts being brought together and assembled and the mine being then loaded at a central mine depot. The work was divided among 140 principal contractors and more than 400 sub-contractors. The unit cost of the new mine is about one-half that of mines before the war, notwithstanding the prevailing high cost of labor and raw materials. This is due to the fact that all the elements of the mine have been standardized in the same way that passenger automobile parts are standardized and that quantity production methods are followed.

Italian Iron and Steel Imports in 1917

Italy's imports of iron and steel in 1917 as compared with 1915 and 1916 are reported as follows in metric tons:

	1915	1916	1917
Scrap	261,468	342,706	226,958
Pig-iron	240,535	302,333	315,954
Castings	6,765	3,218	4,014
Blooms and billets	64,032	25,982	42,894
Rods, bars, etc.	72,470	159,552	420,442
Sheets and plates	22,232	24,789	52,376
Rails	1,871	10,469	36,303
Tubes	6,438	6,452	7,925
Sheets, tinned, etc.	15,327	18,806	32,077

The increase in 1917 in pig iron, rods, bars and rails is marked. Machine tool imports last year were 15,069 tons as against 22,488 tons in 1916, and 6690 tons in 1915.

No Contracts for Semi-Steel Projectiles

CHICAGO, Sept. 11.—So far as can be learned no contracts for semi-steel projectiles have been placed with foundries in the Chicago district. The specifications as published in THE IRON AGE of June 27 stood unchanged last week. It is recognized that the making of these shells requires specific knowledge and to be done successfully must absorb the capacity of a plant. It is not a jobbing proposition. The building of new foundries is not contemplated; in fact, is to be discouraged.

The Smoke Prevention Association held its annual convention at Newark, N. J., Aug. 20-22, with over 50 delegates from all parts of the country in attendance. The principal topics of the gathering were coal conservation and power plant efficiency. Thursday, Aug. 22, was designated as "Railroad Day," with an increased attendance over the previous days. Among the papers presented was, "Smokeless Operation with Chain Grates Stokers," by Thomas Marsh, chief engineer, the Green Engineering Co., East Chicago, Ind.; "Boiler Room Efficiency," by A. H. Blackburn, chief engineer, the Underfeed Stoker Co. of America, Chicago; and "Burning Pulverized Coal," by H. D. Savage, vice-president, the Locomotive Pulverized Fuel Co., New York. Warren A. Edson, Boston, was elected president of the association for the ensuing year. It was voted to hold the next annual meeting at Chicago.

BRIDGEPORT STRIKE CONTINUES

Leader Narrowly Escapes Being Thrown Into the River

The striking toolmakers and machinists in Bridgeport, Conn., have met almost daily the past week, but virtually no progress has been made in settling the controversy over the matter of classification and high vocational minimums. The number of strikers has somewhat increased.

It is the consensus of opinion in Bridgeport that the men are out because they are ill-advised, not because they are in any sense slackers or traitors, as they have been hastily called by some local speakers. The leader, in a meeting early in the week, announced that the next day he would call out the full crew of the Bullard Engineering Co. The workmen of this plant had worked a half day Labor Day without pay to show their interest in the production of heavy ordnance. When he appeared the next day to carry out his self-appointed task, only the intervention of the police saved him from being thrown into a nearby stream by the Bullard workmen. Under such leadership, the men have not been led to see that they are in the wrong—not necessarily in the wrong in regard to their grievances or demands which the Labor Board has set up tribunals and machinery to adjust, but in the wrong in the manner in which they have placed themselves out of court, and that to sustain their action would be to make industrial peace impossible.

The strike is a protest against the long delay they have been subjected to in their effort to get a settlement and the further long delay they see ahead before the machinery established by the award of the Taft-Walsh board can bring about a settlement of the main question. At a meeting last Friday afternoon, they sent a telegram to President Wilson, to which they have not received a reply. It is in part as follows:

Thirty-five per cent of our membership are now fighting in France. We, the other 65 per cent, are willing to work here or in the trenches to our last rag, and then naked, without pay, and regardless of hours or working conditions, for the Government and the people of the United States, in order that this war might be won. We will surrender to you every right that we, as organized laborers, have achieved in the long struggle with our economic masters, to speed the efforts of our brothers in the first line of the fight. All that we ask is that we continue to subsist so that we may continue to work. We pledge all that we have in the common cause. We stand ready either to work or to fight for the common end. But we refuse either to work or to fight one day longer for the private enrichment of a few men who have already wrapped up too many millions of dollars that we have produced, out of this war.

We are in thorough accord with the pronouncement of the National War Labor Board of July 31 that this war "is an interregnum in which industry is pursued only for the common cause and the common ends." We agree that the war should be an interregnum, but we deny that those in control of industry regard it as such, and until they do, we cannot.

They continue to amass unprecedented fortunes from our toil. And then they employ every effort to crush our efforts to protect ourselves and our families. While they refuse us a minimum wage commensurate with our value and the demands of ordinary life, we are besieged from the other side by a group of exploiters in life's necessities, who demand prices so extortionate that, between the two, the workers of this country and their families are daily being reduced to a condition of positive deprivation. If the war is to be an interregnum from such a condition none will be happier for it than the worker. But it is not. It is, so far as industry is concerned, still a battle for life, with the employing aggressors holding the upper hand. It is time for the strong arm of the Government to intervene. Let the Government see the necessity and take over the essential industries. It will mark the end of profiteering and of discontent. Not until the workers know that their energies, 100 per cent, are being devoted to the common cause will the economic struggle come to an end.

Workers in Essential Industries

Need of 17,000 more laborers in the Pittsburgh district plants producing war essentials has caused

the United States Employment Service to plan the organization of a Federal Emergency Board in that to provide for taking the men needed for war mater from plants not making war products. This was known at a meeting last week when the Managers' Employment Association of Pittsburgh was addressed by F. A. Stevens of the United States Employment Service, Washington. The members of the Federal Employment Board at Pittsburgh consist of representatives of essential and non-essential factories, a representative of the Managers' Employment Association and labor representatives. These will determine the plants from which the labor will be secured for war purposes. Elmer Harris has been appointed superintendent of the United States Employment Service for Western Pennsylvania.

Employees of the New Jersey Zinc Co. at the Lehigh ton, Pa., works have received an advance of 10 per cent in wages.

Employees at the foundry of the Bucks Stove Range Co., St. Louis, have received a wage increase averaging from 45 to 70c. per day.

The General Electric Co., Schenectady, N. Y., announced a wage advance of 10 per cent for all employees at the local plant, this being in addition to the 10 per cent bonus plan now operative at the works. Employees who have been connected with the company for five years or longer, will receive an additional increase of 5 per cent. About 4000 office employees are affected.

The Bethlehem Steel Co. has commenced the employment of women for manual labor at its Steelton, Pa., works. A squad of 10 women is now doing the work, and it is expected to increase this number at an early date.

An adjustment of wages and hours has been made at the plant of William Wharton, Jr. & Co., Easton, Pa., a branch of the Taylor-Wharton Iron & Steel Co., effecting a total increase in the regular payroll of about 20 per cent. Time will be computed on an 8-hr. basis, allowing time and one-half for overtime and double time for Sundays and holidays. Ten hours will constitute a working day, and on such basis, employees will receive 11 hours' pay for 10 hours' work. An advance of 10 per cent has been given piece workers at the plant. About 1200 persons are employed at the works.

Boiler makers, machinists and blacksmiths at Savannah, Ga., have established an 8-hr. day, with double time for overtime work.

Prominent officials of two large steel concerns in Youngstown, Ohio, district say it is their experience that at their plants it is necessary to keep nearly 50 per cent more men on the pay-rolls than would be necessary to operate the plants were the men to report regularly for work instead of intermittently as they do now. It is said the labor shortage at manufacturing plants is not so much a shortage of men as it is a shortage in labor performed by the men. In the plants, common labor is being paid from \$4.20 up to \$4.80 per day of 10 hours, and these men are making so much money that they work only four or five days per week. Labor is so scarce that it has to be handled very carefully, and a reprimand from an employer often results in the men quitting work at once, going to another plant and getting work perhaps at a higher wage than he was receiving before. This prevails only in common labor but to some extent in skilled labor.

Uncertainty on the Coast

SAN FRANCISCO, Sept. 6.—Representatives of Coast shipyards, the California Metal Trades Association and California Foundrymen's Association have returned from Philadelphia and Washington, where they were in conference with representatives of the labor unions, Emergency Fleet Corporation and the Wage Adjustment Board. The employers are somewhat uncertain as to the result of the conference. O. H. Fisher, president of the Union Gas Engine Co. and also of the California Metal Trades Association, reports that he has not

and what decision the Fleet Corporation and Wage Investment Board have reached. The delay is causing damage to the shops and foundries, as they cannot figure accurately on the cost of any work so long as they are not sure of the wages of their men.

Organizing at Chicago

Several meetings have been held and others are scheduled in the Chicago district for the organization of iron and steel workers. Advantage was taken of Labor Day to spread the propaganda announcing meetings and to advertise the movement. The gatherings have been attended by delegates from Gary, Indiana, Joliet, South Chicago and Chicago, proper, and it is planned to start agitating in Milwaukee, St. Paul and other points.

Proposed German Steel Federation

Since January, 1915, there has been before the German iron and steel industry the proposal to form a Stahlbund or steel federation, an organization altogether apart from the long standing Steel Syndicate. The function of the new organization is not to be the control of sales, all of this being in the hands of the Steel Syndicate or Stahlwerks Verband, but the German Stahlbund, as the new federation was to be known, is expected to promote the formation of syndicates to maintain existing combinations. The Steel Syndicate has for years taken in semi-finished steel, railroad material and shapes. One thing expected of the Stahlbund was the formation of additional sales syndicates for bars, plates, sheets, wire rods and tubes. A part of the new organization's scheme was made by a committee in May, 1915, but owing to difficulties in carrying out the project was finally abandoned. The Government in recent months has asked that negotiations be resumed and they are now in progress. The Steel Syndicate agreement expires with this year and the Government desires that a decision for its renewal be made by Oct. 1.

The proposal for the syndicates under the direction of the projected Stahlbund contemplates three groups of products: A, for semi-finished steel, railroad material and shapes; B, for bars, wire rods, plates and tubes and rolling stock, and C, for forgings, castings and sundry steel products. The works in group C were for a time to remain independent, so as not to complicate the process of syndication by their action.

Additions to Export Conservation List

WASHINGTON, Sept. 11.—(By wire).—The War Trade Administration has announced the addition of the following commodities to the export conservation list: Aluminum, metallic and all articles containing 10 per cent or more in weight of metallic aluminum (individual articles not required in Canada or Newfoundland); pig lead and shells loaded and unloaded and reloading and cleaning tools for same; pig lead, lead pipe, lead; oxide of tin, bichloride of tin, tin salts, and articles either made of tin plate or coated and lined in tin; titanium alloys, titanium compounds, uranium ores, uranium alloys, uranium ores and uranium salts.

Recently about 80 business and professional men in Connellsville, Pa., and vicinity worked on Sunday and Monday (Labor Day) at the Davidson plant of the H. C. Frick Coke Co., in order to speed up production of coke. H. E. Mason, superintendent of this plant, issued a call for help, which was responded to promptly, and these men loaded close to 40 cars of coke on Sunday and Monday, for which they were paid at the rate of \$7 a car, or about 53 cents per hour. They were paid off for their work on Monday evening, and the proceeds turned over to the Red Cross. Boy Scouts helped the men by carrying water and in other ways. Among the men who worked on Sunday and Monday were three ministers.

MINERALS FOR FERROALLOYS

A Government Corporation Proposed and a \$50,000,000 Revolving Fund

WASHINGTON, Sept. 10.—The Senate Committee on Mines and Mining has rewritten the so-called Foster bill, passed by the House, to put the output of various minerals into the hands of the President. Instead of the minimum price principle, which the House had inserted in this bill, the Senate provides for the adoption of the "contract system," by which the Government is to be the buyer and seller. For this purpose it appropriates \$50,000,000, which is to be used as a revolving fund. This is to be done through a corporation to be organized by the President, and whose capital stock is to be held and voted for the exclusive benefit of the United States. The authority granted by the act is to cease in two years after the termination of the war. This provision also eliminates the licensing feature which the House had written into its bill and to which there had been opposition by the mining industries. The Senate accepts the House bill's itemization of precious metals, except that it adds phosphorus and substitutes sodium for sea salt. The list of minerals covered by the Senate bill follows:

Antimony, arsenic, ball clay, bismuth, cerium, chalk, chromium, cobalt, corundum, emery, fluorspar, ferrosilicon, Fuller's earth, graphite, grinding pebbles, iridium, kaolin, magnesite, manganese, mercury, mica, molybdenum, osmium, sodium, platinum, palladium, paper clay, phosphorus, potassium, pyrites, radium, sulphur, thorium, tin, titanium, tungsten, uranium, vanadium and zirconium.

In addition, the President is given authority from time to time to add to the list "such other rare or unusual elements" as he may determine to be "essential to the national security and defense, and to the successful prosecution of the war, and for the support and maintenance of the Army and Navy." Franklin K. Lane, Secretary of the Interior, has formally approved the Senate bill. In a letter to Senator Henderson, chairman of the Committee on Mines and Mining, he also says:

Everyone who has followed the shipping situation is aware of the difficulties which have hindered or prevented the importation of many mineral commodities which were not produced in sufficient quantity in this country before the war. The bill is designed to relieve this condition by enabling the Government to more aggressively develop our domestic resources and thereby become less dependent upon foreign sources of supply. In brief it will permit the Shipping Board to place more vessels at the disposal of the Government for its military program.

I believe that this result alone is ample justification for the bill, but it will also serve to accomplish other ends which are of equal importance. It will insure the Nation against any interruption of war work because of inadequate supplies of the specified mineral products. It will allow the Government to more effectively direct the distribution and use of the different minerals and metals for the purpose of discriminating between essential and non-essential industries. The Government may enforce economies in the preparation and use of the different commodities, and lastly, mining men may be given the assurance and promise of support from the Government to which they are entitled before they should be expected to undertake new mining enterprises which are of vital importance to the country.

I am convinced that the passage of this bill will contribute in a most material way to hasten our war plans and at the same time stabilize and assist the mining industry which to-day faces many grave problems not common to other industries. May I add that the need of this legislation is immediate. It is a war measure which will place the Government in a position to command a large part of the mineral resources of the country. I recommend the bill to the favorable attention of Congress.

Chairman Baruch of the War Industries Board also wrote to Senator Henderson urging the immediate passage of the bill.

The Penn Seaboard Steel Co., New Castle, Del., has commenced operations in its new rolling mill.

Machinery Markets and News of the Works

TOOLS FOR GUN WORK

Three Inquiries Out in Cleveland

American Brake Shoe & Foundry Co. Wants More than 150 Machines

The American Brake Shoe & Foundry Co. has inquired in the Cleveland market for about 150 tools for gun work at its Erie, Pa., plant. The list includes 100 plain and vertical milling machines, 50 lathes and other tools. In the Cleveland market there are other inquiries from companies engaged in gun work, one involving about 50 tools and another about 25 tools.

No action has been taken at this writing on the large list of the Baldwin Locomotive Works, Philadelphia. The Chicago machine-tool trade has learned that the list will be bought from the main office of the works in Philadelphia.

New York

NEW YORK, Sept. 9.

Plans are being made by the Winchester Repeating Arms Co., New Haven, Conn., for doubling its output of ammunition. Considerable building construction will be called for and the expenditure of approximately \$500,000 for equipment, which for the most part is made up of machines of the smaller sizes. No action will be taken definitely to place orders until instructions are received from Washington to go ahead. Decision to proceed with the enlargement is, however, expected shortly.

The strict enforcement of the Government edict against plant expansion in the East is having a noticeable effect in cutting down the number of machine-tool lists coming from local and nearby plants. Dealers admit the past week to have been a very slack one aside from small-lot and single-tool orders, which are always coming in. The trade of this character is a very good one. In general August transactions have been large, although now more scattered than of late. The month's business here has not been a record one, however, and a comparison of some agencies in the various large cities shows that the barred industrial zone has shifted the bulk of machine-tool buying into the mid-West. New England, in particular, outside of a few important munition makers, is especially quiet.

Because of these building restrictions the Locomobile Co. of America, Bridgeport, Conn., is reported to have been unsuccessful in securing Government approval for plant expansion to provide for its production schedule for Liberty tank motors, and is said to be planning to turn its operations over to 100 per cent war work. By a rearrangement of equipment required floorspace is to be made available. The great overcrowding of workers at Bridgeport, with no facilities for bringing in more, is stated to have been the principal reason for the embargo.

A number of orders have been placed by the Government for the manufacture of 80-in. lathes, and 102-in. lathes are to be produced. Final conference to agree upon the design of the latter size is to be held this week at Pittsburgh. The concentration by machine-tool builders upon the manufacture of the larger sized tools has put a premium on the 14-in. and some smaller sized lathes.

The Bethlehem Shipbuilding Corporation, Bethlehem, Pa., has revised orders for 42 cranes for its Alameda plant and is to let contracts for six more. Of those bought, the Cleveland Crane & Engineering Co., Wickliffe, Ohio, has been awarded 32, of which the last 10 include 1 5-ton 46-ft. 10-in. overhead, 5 3-ton 50-ft. span and 4 10-ton 100-ft. span, all single-leg gantries; 1 15-ton 100-ft. span crane has been let

A new fabricating shop for ship material is to be equipped at Baltimore by the Baltimore Car & Foundry Co., a subsidiary of the Standard Steel Car Co., Pittsburgh. The shop will cost about \$1,000,000 including equipment.

The Winchester Repeating Arms Co., New Haven, Conn., is getting quotations on tools needed for doubling its output of ammunition. About \$500,000 worth of machines, mostly of the smaller sizes, will be bought.

The Government has placed a number of orders for large lathes. One Eastern company will make 80-in. lathes and another will make 102-in.

Crane business is quiet. The Bethlehem Shipbuilding Corporation, Bethlehem, Pa., has revised its orders for the new Alameda, Cal., shipyard. The Cleveland Crane & Engineering Co. has been awarded 32, one gone to the Milwaukee Electric Crane & Mfg. Co., three to the Shepard Electric Crane & Hoist Co., and six double-cantilever gantry cranes to the Northwestern Engineering Co., a Pacific Coast concern.

to the Milwaukee Electric Crane & Mfg. Co., Milwaukee, Wis.; 3 to the Shepard Electric Crane & Hoist Co., Milwaukee, N. Y.; and 6 to the Northwestern Engineering Co., the Pacific Coast. These last are to be 5-ton double-cantilever gantry cranes 40 ft. high, 163 ft. overall span, and are for the plate and angle storage yards.

Other crane lists about to be let are the two lots of each by the Air Nitrates Corporation, 360 Madison Avenue, New York, and 1 10-ton and 1 75-ton by the Federal Shipbuilding Corporation, Kearny, N. J. The New York Central Railroad is inquiring for 4 10-ton cranes so that awards are not expected for several weeks. Bids were called for last Sunday for four semi-portal wharf cranes for the Quartermaster stores at Boston, instead of 12 as originally announced.

The Ordnance Department, Washington, has awarded a contract to the Arthur McMullen Co., 149 Broadway, New York, for a group of buildings at Magnolia, N. J., to cost \$3,000,000. Col. F. M. Gunby, Washington, is advisory engineer.

The General Electric Co., Schenectady, N. Y., is having preliminary plans prepared for a boiler plant at the works of its subsidiary, the Sprague Electric Co., Bloomfield, N. J.

The Crucible Steel Co. of America, Harrison, N. J., has awarded a contract to W. H. & F. W. Cane, 235 Broadway, New York, for a group of shop buildings at its plant, South Fourth Street to cost \$86,000.

The Navy Department has taken over the plant of J. Spurr & Sons, foot of Warren Street, Harrison, N. J., manufacturers of cut stone, consisting of two buildings, 100 x 100 ft. and 75 x 150 ft. One will be equipped for the installation of machinery in submarine chasers and other boats being constructed at the Brooklyn Navy Yard, as well as for assembling work as required. The other building for present will be used for storage.

The Public Service Corporation, Newark, N. J., operating the Public Service Railway Co. and the Public Service Electric Co., has received the following appropriations from the Government for extensions: Extension of traction line at Newark Bay, including 18 additional cars, \$521,739; extensions to traction lines, power equipment and 33 additional cars, Camden, Gloucester City and vicinity, \$1,240,784; extensions to electric feeder system at Kearny, \$39,566; extensions, including electrical work, to housing development at the New York Shipbuilding Co., Yorkship Village, Gloucester City, \$215,000.

The Slocum, Avram & Slocum Laboratories, Inc., 551 West Twenty-first Street, New York, has been incorporated in New Jersey, with headquarters at Newark, to operate a machine works. The company has a capital of \$500,000. Proper

has recently acquired at Pacific and Malvern streets, Newark, consisting of a one and three-story factory, for the manufacture of range quadrons for the Government and other products, and construction of a one-story machine shop, 100 x 10 ft., to cost \$75,000, is now under way. H. J. Slocum, S. Slocum and G. H. Warren, all of New York, are the incorporators of the company. Arthur F. Hinrichsen, 120 Pacific Street, Newark, is corporate representative.

The Federal Shipbuilding Corporation, Kearny, N. J., a subsidiary of the United States Steel Corporation, has had plans prepared for the construction on the east side of the Hackensack River of four large drydocks with auxiliary shops. The docks will be 650 ft., 550 ft., and two 475 ft. In connection with the new drydock system it is proposed to dredge a 20-ft. channel in Newark Bay. The recently published reports that the contract for the construction of the drydocks had been awarded to a New York contractor has been denied by the company. Bids will be asked at an early date.

The Foundation Co., 233 Broadway, New York, has received a contract from the Emergency Fleet Corporation for the construction of five more vessels at its Kearny, N. J., yards. The boats will be 278-ft., 3500-ton cargo barges.

A one-story machine repair shop and office, 38 x 76 ft., will be constructed at 18-20 West Ninth Street, Bayonne, N. J., by John R. Proctor, Inc., engineer, 721 Broadway, New York.

The T. George Stiles Co., 625 Devon Street, Arlington, N. J., has filed notice of organization to manufacture railroad appliances. T. George Stiles is president.

The Vulcan Iron Works, foot of Morris Street, Jersey City, N. J., has filed plans for two additions to its plant at 34-36 Hudson Street, to cost respectively \$10,000 and \$10,000. It has recently acquired the boiler and ship repair works of Theodore Smith & Sons, foot of Essex Street, which is understood will be used for the manufacture of marine engines for the Government.

Sprout, Waldron & Co., Jersey City, N. J., have been incorporated with a capital of \$800,000 to manufacture machinery. L. B. Sprout and John Waldron, Muncy, Pa., and J. Raush, Williamsport, Pa., are the principal incorporators.

The Jersey City Cutting & Welding Co., 202 Monmouth Street, Jersey City, has filed notice of organization. John Lee, 261 Pearsall Avenue, heads the company.

A one-story brick boiler plant to cost \$20,800 will be constructed by Swift & Co., 154 Ninth Street, Jersey City, N. J., at 25-26 Henderson Street.

The Arms & Shell Forging Co., Jersey City, N. J., has been incorporated with a capital of \$125,000 by E. Huebner, J. Houghtolin and F. H. Baldwin to manufacture steel forgings, etc.

The United Steel Ceiling Co., Jersey City, N. J., has filed notice of organization to operate a works at 584 Bergen Street. Aaron Herr heads the company.

The Vulcan Foundry Co., Jersey City, N. J., has been incorporated with a capital of \$100,000 by H. A. Black, A. F. Black and J. W. Stout.

The Columbia Machine Works & Malleable Iron Co., 269 West Street, Brooklyn, manufacturer of armatures and electrical specialties, has awarded a contract to the Iron Co., 217 Broadway, New York, for a one and two-story brick addition, 80 x 151 ft., on Euclid Avenue, near Atlantic Avenue, to cost \$50,000.

The Nautical Instrument Mfg. Co., New York, has been incorporated with a capital of \$33,000 by E. S. Eriksen, T. E. E. and G. Reith, 74 Broadway.

The Hullfin Ship Corporation, New York, has been incorporated with a capital of \$100,000 by L. M. Rankin, S. Golden and W. J. Brown, 110 West Fortieth Street, to operate a shipbuilding plant.

The Pier Machine Works, Inc., foot of Pioneer Street, New York, has increased its capital from \$50,000 to \$100,000.

James MacKenzie, New York, has awarded contract to Standard Concrete Steel Co., 105 West Fortieth Street, for improvements in his two-story machine shop at 3 West Eleventh Street, to cost \$15,000.

The Bond Machine & Tool Works, New York, has been incorporated with a nominal capital of \$5,000 by W. Bass and R. Reill, 260 Franklin Street.

The American Mfg. Co., Noble and West streets, Brooklyn, has awarded a contract to John T. Woodruff & Son, 100 Plaza, Long Island City, for a one-story machine shop, garage, on Franklin Street, to cost about \$25,000.

The Bronx Structural & Ornamental Iron Works, New York, has been incorporated by W. Goldstein, S. and F. Goldman, with a capital of \$50,000, to take over and operate the iron works of Grossman Brothers & Rosenbaum, 82 West Avenue.

The Ryan Mfg. Co., New York, has been incorporated with a capital of \$10,000 by W. S. Ryan, D. J. Dowling and C. S. Ashley, 15 John Street, to manufacture automatic cut-out switches, etc.

Howell, Field & Goddard, Review Avenue, Long Island City, N. Y., manufacturers of fireproof doors, etc., will build a one-story addition to their plant, about 50 x 200 ft.

The Dace Rim Corporation, New York, has been incorporated with a capital of \$50,000 by E. E. Fish, J. T. Burney and H. B. Wood, 102 West Seventy-fifth Street, to manufacture automobile rims, etc.

The Ordnance Department, Washington, is having plans prepared for the construction of three electric power plants at Camp Mills, L. I., Fort Terry and Fort Wright, N. Y. The structures, with laundry plants and machinery, are estimated to cost \$300,000 each. Gen. R. C. Marshall is in charge; Col. F. N. Gunby, Washington, is advisory engineer.

The Victory Hoisting & Coaling Corporation, New York, has been incorporated with a capital of \$50,000 by M. C. Sullivan, J. C. Duke and B. B. Mead, 1999 Washington Avenue, to operate a shipbuilding plant.

The Connecticut Electric Steel Co., 50 Church Street, New York, manufacturer of steel castings, etc., with works at Hartford, Conn., has increased its capital from \$105,000 to \$157,500.

The Yale & Towne Mfg. Co., 9 East Fortieth Street, New York, has awarded contract to the American Concrete Steel Co., 27 Clinton Street, Newark, N. J., for a six-story reinforced-concrete addition, 50 x 261 ft., to its plant at Stamford, Conn.

The Coil Spring Co., New York, has been incorporated with a nominal capital of \$5,000 by H. Friedlander and S. Levy, 138 Essex Street.

The Reade Tool & Machine Co., 8 Reade Street, New York, has filed notice of dissolution.

The Herman Auto Aero Radiator Mfg. Co., New York, has been incorporated with a capital of \$10,000 by H. Greenburg, S. Burman and O. Munk, 575 Riverside Drive.

The Moran Towing & Transportation Co., 17 Battery Place, New York, has commenced work on remodeling its shipyard on Mill Creek, Tottenville, S. I., recently acquired, for ship repair work on its boats. In this same district the Tracy Transportation Co., 1 Broadway, New York, will operate a shipbuilding works at the foot of Fisher Avenue and work is under way to provide for active operation at an early date. The Transatlantic Shipyards Corporation, 95 Liberty Street, New York, will operate a shipbuilding plant at the foot of Main Street and work is well advanced to insure its early operation.

Buffalo

BUFFALO, Sept. 9.

In connection with the proposed abolishment of the manufacture of pleasure automobiles, effective Jan. 1, the gear and transmission companies at Syracuse, N. Y., formerly devoting production to this end, are arranging plans to operate their plants on other work, such as gears for automobile trucks, airplanes, etc., commencing the first of the year. Four large local companies are affected, the Brown-Lipe-Chapin Co., 110 Seneca Street; the Durston Gear Co., 213 Maltbie Street; the New Process Gear Corporation, 500 Plum Street, and the Brown-Lipe Gear Co., 1117 West Fayette Street. The first company for some time past has been manufacturing gears for Government and commercial trucks, as well as for tanks, airplanes and tractors, and is practically devoting its entire output to such work. Considerable new machinery of heavy type has recently been installed at its works to facilitate the manufacture of heavy gears and transmissions. The New Process Gear Co. has been working on Government contracts for months past and, it is said, will put the plant on a 100 per cent war basis by the first of the year. The Brown-Lipe Gear Co. and the Durston Gear Co. are likewise arranging to keep their plants operating at capacity in the production of specialties for the Government.

The North Country Shipbuilding Corporation, Ogdensburg, N. Y., recently incorporated with a capital of \$150,000, is reported negotiating for shipbuilding contracts. E. J. Burns is general manager.

Fire Aug. 28 destroyed the plant of the Hessler Foundry & Mfg. Co., Mitchell Street, Oswego, N. Y., with loss reported at \$150,000. The works specialize in the production of iron and brass castings, etc. It is understood the plant will be rebuilt. George J. Hessler is president.

The Baldwinville Shipyards, Baldwinville, N. Y., is said to be planning its removal to Oswego, where increased facilities will be provided. It is understood additional equipment will be installed.

The Genesee Bridge Co., 666 Plymouth Avenue, Rochester, N. Y., is having plans prepared for a one-story brick and steel addition, 60 x 65 ft.

Contract has been awarded by the Bausch & Lomb Optical Co., 635 St. Paul Street, Rochester, N. Y., for a one-story and basement foundry, 80 x 115 ft., at Martin Street and Hertel Alley to cost \$200,000.

The New York Central Railroad, Grand Central Terminal, New York, has awarded contracts for additional buildings at its new engine house and shops at Gardenville, N. Y., to the J. W. Cowper Co., Fidelity Building, Buffalo.

The Malone Light & Power Co., Malone, N. Y., has increased its capital from \$194,000 to \$300,000 for proposed extensions.

A one-story boiler plant, 38 x 65 ft., will be erected by the Remington Arms Co., Ilion, N. Y.

The addition to the shipbuilding works of the Buffalo Marine Construction Co., Buffalo, to be located on Michigan Avenue will be about 60 x 120 ft. The company was recently incorporated with a capital of \$275,000 by F. W. Allen, R. E. Powers and associates.

The plant to be erected by the Prest-O-Lite Co., Indianapolis, Ind., in the South Buffalo Terminal section, Colgate Avenue and Hopkins Street, Buffalo, will consist of four one-story buildings to be equipped for charging and other work. Plans are being prepared.

The Superior Bronze Co., 520 West Twelfth Street, Erie, Pa., has purchased a site on West Nineteenth between Poplar and Cherry streets, and will erect a foundry at a cost of \$15,000, for increased operation. About 100 additional employees will be taken on. The new equipment will enable the company to handle all kinds of bronze and aluminum castings. W. H. Dempelfeld is secretary and treasurer.

The Metal & Alloy Specialty Co., 25 Illinois Street, Buffalo, Elmer Rae, vice-president and manager, has filed application for building permit for factory 60 x 100 ft., two stories, of brick and steel, to be erected at Marion Avenue and the New York Central Railroad.

The Pierce-Arrow Motor Car Co., Buffalo, is taking bids for two testing buildings, 100 x 260 ft. and 30 x 300 ft., to be erected at its plant at Elmwood Avenue and the New York Central Railroad Belt Line.

The Monarch Knitting Co., Buffalo, has filed building permit for erection of a boiler house, dye house and storehouse to cost \$22,000, at its plant, Doat Street and Rustic Place. It has also filed plans for a two-story brick and steel boiler plant to cost \$60,000.

The Auto Products Mfg. Co., A. E. Davenport, president, 40 Elm Street, Buffalo, is having plans prepared for a factory building at Genesee and Guilford streets.

New England

BOSTON, Sept. 9.

The labor situation, which is the dominant feature in New England industry at this time, remains practically unchanged from last week. The air is filled with unfounded or unverified rumors of impending strikes and of reports that Washington will take over many New England industries in which strikes now prevail or are threatened. The general opinion, however, is that there will be little change until the action of the Government in the case of the Blake & Knowles, Smith & Wesson and Bridgeport controversies is made known.

Business in general shows no signs of a let-up and manufacturers report offerings larger than the output of the factories and that they are not advancing in overcoming the shortage of labor, which is the great limiting factor. It is expected that the new draft will make serious inroads into working forces, particularly those engaged in indirect labor, and that tentative plans to dilute labor with women workers will have to be put into operation within the next month. Machinery jobbers report that the sale of small lots is keeping up the volume of business but that large lists are notably absent.

The Lutes & Draper Machine Co., Peabody, Mass., has been incorporated with authorized capital stock of \$50,000 to manufacture leather working machinery. Charles R. O'Connell is president and Carvel R. Lutes, 24 Main Street, Peabody, treasurer.

W. W. and C. F. Tucker, 516 Asylum Street, Hartford, Conn., are asking bids on a machine shop at 181 Franklin Avenue.

The Ainslee Machine & Tool Co., Hartford, Conn., is asking bids on a factory, 50 x 106 ft., one story, on Jefferson Avenue.

The Waterbury Buckle Co., Waterbury, Conn., is asking bids on a three-story factory to cost \$30,000.

Philadelphia

PHILADELPHIA, Sept. 9.

The Philadelphia Rapid Transit Co., Philadelphia, has filed plans for extensions in its repair shops at Forty-ninth Street and Woodland Avenue to cost \$45,000. The installation of two 5-ton traveling cranes is specified.

The Emergency Fleet Corporation, Philadelphia, is reported considering the construction of a steam-operated electric power plant at the Hog Island shipyards. To provide for increased electric service at the plant, the Philadelphia Electric Co. has had plans prepared for its proposed electric generating station at Beach and Palmer streets, to cost several million dollars. Stone & Webster, 147 Milk Street, Boston, Mass., are engineers.

The Water Bureau, Philadelphia, is planning the installation of new stokers at its boiler plant at the city water works, Lardner's Point. The Department of Public Works will make alterations in its repair shop at Twelfth and Race streets.

The Midvale Steel & Ordnance Co., Widener Building, Philadelphia, is taking bids for the construction of a one-story concrete and steel power plant at its Nicetown works.

The Marlin-Rockwell Corporation, Philadelphia, is considering improvements in its Richmond Radiator Co. works at Tacony and Devereaux streets, to cost \$30,000.

The Super Glass Co., 3400 Disston Street, Philadelphia, said to be planning the erection of several large additions to its works in the Wissinoming section. It is operating its works for the manufacture of lenses for gas masks, and recent large orders received necessitate expansion.

The Hall Gas Engine Co., 4825 Garden Street, Philadelphia, is building a one-story addition to its machine shop.

The Baldwin Locomotive Works, Fifteenth and Spruce Garden streets, Philadelphia, has filed plans for a shop addition to cost \$4,400.

The Quaker City Gear Works, 1922 North Front Street, Philadelphia, has taken out a permit to make extensions to cost \$4,500.

The Elisha Webb & Son Co., Philadelphia, has broken ground for its proposed one-story metal-working shop, 100 ft., on East Columbia Avenue, to be used as an extension to its ship chandlery works at 136 South Front Street.

The War Department has acquired about 2000 acres near Pedricktown, N. J., to be used for the Delaware depot of the Ordnance Department. It is estimated that the total cost will be about \$250,000.

Fire Aug. 31 is reported to have destroyed the plant and machinery of the Farmers Creamery Co., Mount Joy, Pa., with loss estimated at \$25,000.

Stape & Bell, Mears Building, Scranton, Pa., are having plans prepared for a coal breaker and stripping works at their coal mines at West, Pa., to cost \$100,000. Frank Davenport, Coal Exchange Building, Wilkes-Barre, is engineer.

The following electric power companies have made application for permission to issue stock or bonds to the Public Service Commission, Pennsylvania, to be used for proposed extensions, improvements, etc., in plants and systems: The Metropolitan Edison Co., Reading, bonds for \$485,500; the Wilkes-Barre Co., Wilkes-Barre, \$200,500, bonds; the Ridgeway Electric Light Co., Ridgeway, bonds for \$300,000; stock for \$105,000; the West Penn Power Co., Pittsburgh, \$2,223,000 in bonds; the St. Marys Electric Light Co., Marys, bonds for \$100,000 and stock for \$225,000; the Johnsonburg Light & Power Co., Johnsonburg, bonds for \$15,000 and stock for \$45,000; the Philadelphia Rapid Transit Co., Philadelphia, \$18,000 in bonds.

The Federal Steel Foundry Co., Delaware Avenue, Chester, Pa., has broken ground for a one-story foundry, 125 x 100 ft., at Delaware Avenue and Rodney Street to cost \$35,000.

The Delion Tire & Rubber Co., Whitehead Road, Trenton, N. J., manufacturer of automobile tires, etc., has increased its capital from \$700,000 to \$1,000,000.

Fire Sept. 4 destroyed two buildings at the plant of the M. M. S. Metal Co., foot of Fall Street, Trenton, N. J., devoted to smelting and other operations, with loss estimated at \$25,000. It is planning to rebuild the structures and replace damaged equipment.

The R. H. Beaumont Co., Drexel Building, Philadelphia, manufacturer of conveyors, etc., is planning to build a one-story plant, 50 x 200 ft., at Twenty-fourth and Hayes streets, Camden, N. J.

The David Baird Co., Delaware Avenue and Pearl Street, Camden, N. J., manufacturer of derricks, will build a one-story addition, 25 x 48 ft., to cost \$15,000. James W. Dray, 435 Haddon Avenue, Camden, has the contract.

The Mt. Morris Coal Co., Mt. Morris, Pa., recently organized, is planning to equip and operate coal properties near Morgantown, W. Va. M. B. Clovis is president.

The American Car & Foundry Co., Milton, Pa., has awarded a contract to the Austin Co., 1319 Filbert Street, Philadelphia, for the erection of an addition, 80 x 100 ft., to cost \$25,000.

Baltimore

BALTIMORE, Sept. 9.

The Baltimore Car & Foundry Co., Baltimore, a subsidiary of the Standard Steel Car Co., Pittsburgh, is planning immediate establishment of a new steel fabricating works at Curtis Bay, Md., to cost \$1,000,000 including equipment. It will make use of present buildings including a one-story shop, 180 x 1650 ft., and erect a number of smaller structures. The plant will specialize in the production of steel plates for shipbuilding work.

The Bartlett Hayward Co., Baltimore, has awarded contract to Morrow Brothers, Fidelity Building, for its proposed shop at its shell works, Scott and McHenry streets, estimated to cost \$900,000.

The plant to be established by the Crown Cork & Seal Co., 1111 Guilford Avenue, Baltimore, at Highlandtown, Md., for the manufacture of cartridges, will be equipped for a capacity of about 1,000,000 cartridges. The five-story building now in course of erection for the works will give employment to over 2000 persons for initial operations. John Hood, Jr., is president.

Frederick Stehr, Baltimore, is planning the rebuilding of a forge and blacksmith shop on Erdman Avenue, recently destroyed by fire.

The Bureau of Yards and Docks, Navy Department, Washington, has completed plans for the proposed nitrate works for the Government at Indian Head, Md. The first unit will cost \$180,000.

The Baltimore & Ohio Railroad, Baltimore, plans the construction of a one-story machine shop and engine-house, 120 x 120 ft., at Putnam and Paca streets. H. A. Lane is chief engineer.

The Union Shipbuilding Co., Fairfield, Md., will build a new shop, boiler house and ways.

The Wilcox Foundry Co., Wheeling, W. Va., has been ordered. Albert C. Wilcox is president.

The Tidewater Power Co., Wilmington, N. C., plans to install additional equipment and enlarge its facilities.

The American Manganese Steel Co., New Castle, Del., will build a two-story pattern shop addition, 25 x 30 ft.

The Metal Egg Crate Co., Fredericksburg, Va., has been incorporated with a capital of \$25,000 by Stewart Ellis and J. P. Hoop, both of Washington, D. C., and H. F. Criswell, Fredericksburg.

In connection with its new plant to replace one recently destroyed by fire, the Virginia Baking Co., Richmond, Va., will build a new boiler plant, 40 x 75 ft.

The Southern Railway Co., Charlotte, N. C., is reported ordering the construction of shops near Big Stone Gap, Va.

The Bureau of Yards and Docks, Navy Department, Washington, is taking bids for the erection of a fuel oil tank at Yorktown, Va., to include a boiler plant, heater and mechanical and electrical equipment, and operating machinery; the initial structure will be three stories of reinforced concrete, 48 x 65 ft.

The American Shipbuilding Co., Brunswick, Ga., is considering the erection of an extension to its works to be used for the manufacture of ship machinery and equipment.

The Charleston Consolidated Railway Co., Charleston, S. C., is to borrow through the War Credits Board the sum of \$200,000 with which to enlarge its power plant, the total of which will be about \$700,000.

Chicago

CHICAGO, Sept. 9.

It is the general understanding of the local machine-tool trade that the buying of the Baldwin Locomotive Works for the contemplated plant at East Chicago will be done at Philadelphia from the main offices. As noted heretofore, foreign sellers have received copies of the list and many figures on such machines as they can supply.

With those having a diversified line of standard tools demand has continued active and their chief trouble comes to be getting stock of which to dispose. When they sell they do so with no certainty that they will be able to replace stock. Good second-hand tools are as scarce as

the proverbial hen's teeth, and a good part of what is uncovered is too old and of such obsolete patterns that it hardly pays to overhaul them.

Reports from all directions indicate the trouble that tool-builders are having in obtaining sufficient labor or tell of trouble with labor in the shops. In several cases adjustments are to come from the War Labor Board. The employment of women in the operation of machines is hopefully regarded as a partial solution of the difficulty. Some tool builders who long have prided themselves on the manner in which they fulfilled their promises have dropped considerably behind in recent months, but a saving clause has been that the buyers of the machines also have had labor difficulties, and so the failure to ship at the specified time has not been the detriment it otherwise would have been. It is evident that prompt action must be taken by the Government to maintain man-power in essential shops if war production is to be maintained, let alone increased. At the moment it seems inconsistent to have army officers making speeches to employees, telling them of the importance of their work as the "men behind the men at the front," while the country is being combed of workers and the essential shops have to release their help. Much is hoped for from the system already inaugurated for retaining essential workers, but it is also hoped that it will be effective before too many men are called away, or too far away.

The J. C. Deagan Co., Berteau and Ravenswood avenues, Chicago, has been in the market for lathes, milling and screw machines for the manufacture of panoramic sights and altimeters for which it has Government contracts.

Large numbers of machines originally intended for export, but for which shipping licenses could not be obtained, on investigation prove to be fitted with metric lead screws, etc., which make changes necessary. High prices are asked for these machines.

The Master Motor Trucks, Inc., Chicago, has leased a building, 100 x 200 ft., at Archer and Wallace streets which will be equipped for manufacturing. The structure augments its present facilities.

The Barrett Construction Co., 30 North Michigan Avenue, Chicago, has been awarded the general contract for remodeling and for additions to a three-story factory, 50 x 100 ft., at West Forty-first Street and Emerald Avenue for the Magnus Metal Co., manufacturer of railroad supplies, 4041 Emerald Avenue. The cost will be \$75,000.

Plans are being prepared for a one-story factory, 80 x 260 ft., at Cleveland for Fischel & Marks, maker of steel products. R. E. Schmidt, Garden & Martin, 104 South Michigan Avenue, Chicago, are the architects.

The General Chemical Co., 112 West Adams Street, Chicago, has been granted a building permit for the construction of a one-story shop, 120 x 142 ft., at 123d Street and Carondelet Avenue, at a cost of \$48,000. George F. Poulsen, Detroit, is the architect.

The Mayer Brothers Co., Mankato, Minn., maker of power hammers, changed its name Sept. 1 to the Little Giant Co.

Work started to-day on car repair shops to cost \$250,000 for the Pennsylvania Lines at Fifty-ninth and Leavitt streets, Chicago. Ten buildings will be of reinforced concrete, including machine, tin and forge shops. Charles B. Johnson & Son, Chicago, are the general contractors. A new round-house was completed at this point two months ago. Because of the number of women employed as track cleaners, engine cleaners and other work, suitable accommodations have been installed.

Milwaukee

MILWAUKEE, Sept. 9.

A decided revival in machine-tool buying, particularly milling machines, is noted by local manufacturers and dealers. The past week has brought a large volume of new business largely from shops engaged in the manufacture of Liberty engines, although there has been a considerable requirement from Government contractors in other lines of war production. New orders are mostly for the heavier types of millers, and call for single tools or small lots up to 15 or 18. A feature of the situation is the renewal of demand from the East, which has been rather slack for several weeks.

Foundry expansion continues as rapidly as owners can get assurance of delivery of new equipment. In numerous instances additions are provided by the utilization of existing buildings.

The National Brake & Electric Co., Milwaukee, is investing approximately \$200,000 in extensions to and improvements in its iron foundry. Contracts were awarded several weeks ago for an addition to the casting shop, core-rooms, etc., and plans have been completed for a new chipping and annealing building, 50 x 225 ft. and 70 x 418 ft., of brick and steel. The work is in charge of Herman J. Esser, architect, 402

Camp Building. Richard P. Tell is president and general manager.

The Koehring Machine Co., Thirty-first Street and Concordia Avenue, Milwaukee, has increased its capital stock from \$300,000 to \$800,000 to provide for extensions of buildings and equipment. The company manufactures concrete mixers and other contractors' equipment. William J. Koehring is president.

The Wisconsin Duplex Automobile Co., Oshkosh, Wis., has changed its corporate style to the Oshkosh Motor Truck Mfg. Co. It recently completed development work on a new commercial car chassis employing a quadruple drive transmission system designed by William A. Besserlich, president and general manager, and has started production. Additional tool and other equipment is being purchased from time to time.

The Wells Mfg. Co., Fond du Lac, Wis., manufacturer of ignition and illumination devices, has moved its plant into the former shop of the Keller Pneumatic Tool Co., which has been remodeled. The building is now 50 x 125 ft., two stories and part basement. Practically the entire capacity is being devoted to Government contracts. J. W. Wellington, Sandusky, Ohio, is president, and J. L. Fuhrman, Fond du Lac, secretary and general manager.

The Northern Foundry Co., Marinette, Wis., which has been manufacturing automotive and agricultural castings in the former foundry of the Marinette Iron Works, has acquired an adjoining shop building and will remodel and equip it as an addition, which will increase the capacity from 50 to 75 per cent. Much of its output is being taken under contract by the J. I. Case Threshing Machine Co., Racine. J. M. Fitzpatrick is general manager.

The Pioneer Mfg. Co., 6703 Greenfield Avenue, West Allis, Milwaukee, has increased its capital stock from \$5,000 to \$25,000 to provide for the extension of its machine-shop business.

The Fabricated Ship Corporation, Milwaukee, organized recently as a consolidation of the Coddington and Newton Engineering companies to build steel vessels for the Government, expects to begin the construction of ships within 30 days. The new yard is 350 x 1600 ft. and located between the Menomonee and Kneeland canals at the foot of Twelfth Street. Ralph E. Newton and Samuel C. Coddington are the managing directors.

The Highway Trailer Co., Edgerton, Wis., which is manufacturing ordnance and aircraft trailers for the Government, has awarded a contract to Griswold Brothers, Edgerton, for the construction of a \$30,000 addition, 40 x 200 ft., to be ready Dec. 1. James W. Menhall is general manager.

Armour & Co., Chicago, will build a new cold storage warehouse, 75 x 100 ft., three stories, at Green Bay, Wis. Plans are being prepared by the company's architects.

The Finn-Olson Freighting Co., Marinette, Wis., has established a small shipyard in the Menominee River at Witbeck Island and will specialize in repairing and rebuilding wooden vessels up to 200 ft. in length. Thomas E. Finn is general manager.

The Acme Pattern Works, 495 Sixty-fifth Avenue, West Allis, has awarded contracts for a two story addition, 50 x 80 ft.

Detroit

DETROIT, Sept. 9.

The Solvay Process Co., Detroit, has let a contract for the erection of a one-story structure, 72 x 80 ft., to cost \$35,000.

The Standard Foundry Co., Detroit, has obtained a permit for additions to its plant to cost \$7,000.

The Sewell Cushion Wheel Co., Detroit, will erect an addition to its factory at Gratiot and Beaufait avenues.

The Aluminum Castings Co., Detroit, has let contracts for alterations and additions to the foundry.

The Charles Bohn Foundry Co., Detroit, has let contracts for the erection of a one-story temporary factory.

Among Michigan concerns to receive Government orders are the following: Lufkin Rule Co., Saginaw, steel tapes; Novo Engine Co., Lansing, engines; American Logging Tool Co., Evart, cant hooks; Fenn Mfg. Co., Charlotte, bush or weed snaths.

The Huntley Machine Works, Holland, Mich., will remove shortly to Muskegon, Mich., where a site has been secured.

The American Machine Corporation, Port Huron, Mich., which some time ago began the erection of a new factory on the St. Clair River, has purchased the plant of the United Fence Co. at South Park as an auxiliary. The company makes munitions.

The Sturgis Go-Cart Co., Sturgis, Mich., has been proposed of to Detroit business men, among whom are John Bodde, vice-president People's State Bank; Norval A. Hopkins, general sales manager, Ford Motor Co.; Charles Tuttle, president Tuttle & Clark; A. L. McMeans, of DeBor Brothers; Fritz Goebel, president Modern Homes Co.; J. B. Corliss, and D. L. Seymour, D. L. Seymour & Co., broker.

The Briscoe Motor Corporation, Jackson, Mich., has broken ground for another addition, making two extensions, 200 ft. and 90 x 100 ft. respectively started within a few days. New docks, warehouses and other construction work is going on incident to Government contracts.

The Reo Motor Car Co., Lansing, Mich., has received additional Government order for military tractors which will keep the plant running to capacity until July, 1920.

The Motors Metal Mfg. Co., Milford Avenue and Marquette Railroad, Detroit, is erecting two large additions to its plant to handle a large Government order for motor parts for ambulances.

Cleveland

CLEVELAND, Sept. 9.

The American Brake Shoe & Foundry Co. has come into the market for over 150 machines for gun work in its Erie, Pa., plant. The list includes 100 plain and vertical mill machines, 50 8, 20 and 24 in. lathes, 10 hand screw machines, 6 drill presses and one shaper. A great deal of Government gun, shell and other work is coming out of these new demands have brought out several other inquiries for round lots of machines, one of which is for about machine tools of various types and another for 25 machines for gun work. Buying the past week was active in lots up to 5 or 6 machines and single tools. Considerable inquiry is coming out for wood-working equipment from shops that have been engaged in non-military work and are now turning their attention to airplane, wagon and other Government work. Among orders placed by local manufacturers the past week were seven automatic milling machines for the Scott-Fetzer Machine Co., six lathes for the Standard Equipment Co., three automatic screw machines for the Winton Co., and two for the De Products Co. The order for bayonets for which a round lot of milling machines will be required has not yet been placed. It is understood that Henry Ford & Son have so far purchased very little, if any, equipment for their Hamilton, Ohio, plant. The American Shipbuilding Co. has completed the purchase of its equipment with the exception of a planer.

The Craig Tractor Co., Cleveland, recently organized to manufacture farm tractors, has commenced the erection of plant on Bliss Road, East Cleveland, 60 x 180 ft. The contract has been placed with the Austin Co. Officers of the Craig company are Henry Dwight Smith, president; Norman Craig, vice-president and general manager; Arthur Judson, secretary; Roland T. Mescham, treasurer.

The Vichek Tool Co., Cleveland, has placed a contract with the Hunkin-Conkey Construction Co., Cleveland, for the erection of its new forge shop, 46 x 196 ft. The company has a large contract for making tool kits for Government motor trucks.

The Peters Machine & Mfg. Co., Cleveland, has increased its capital stock from \$75,000 to \$500,000. It is engaged almost exclusively in making universal joints for automobile trucks.

The Ohio Reamer Co., Cleveland, is erecting a new factory, 80 x 118 ft. In addition to its regular products it is now making airplane parts.

The Central Brass Co., Cleveland, has placed a contract for a one-story extension, 35 x 72 ft.

The Western Machine Products Co., 7213 St. Clair Avenue, Cleveland, will erect a four-story factory, 45 x 53 ft.

The Cleveland Mfg. Co., Cleveland, will erect an addition, 67 x 140 ft. at 1831 East Thirty-eighth Street.

The American Crane & Engineering Co., Toledo, has been incorporated with a capital stock of \$50,000 by Charles E. Tucker, William F. Billingsley and others. It is reported that the company has taken a Government contract for locomotive cranes and will build a plant for their manufacture and also hoisting equipment.

It is reported that the Timken Roller Bearing Co., Canton, will shortly place a contract for the erection of another factory, one-story, 100 x 250 ft.

The Heitsel Steel Form & Iron Works, Warren, Ohio, had plans prepared for a new factory, 110 x 150 ft., and will let the contract shortly.

The American Welding & Mfg. Co., Warren, Ohio, is in the market for a punch press with a 5 or 6 in. stroke.

Cincinnati

CINCINNATI, Sept. 9.

Nearly all local machine-tool builders are figuring on some part of the large list issued by the Baldwin Locomotive Works, but as far as can be ascertained none has as yet been favored with any part of the business. The smaller tools wanted could be delivered with a fair degree of promptness, but there would be delays on the larger machines.

It is reported that a delegation from Brazil, indirectly representing the Brazilian Government, will visit Cincinnati some time this month with the idea of placing orders for machine tools and other equipment. It is understood that some heavy purchases have been made in the East. An inquiry was recently received from Callao, Peru, and some business may be expected from that source after the war.

A number of firms in this section making automobiles have taken war contracts and it is rumored that one company in Indianapolis will engage in the manufacture of farm tractors. Not much extra equipment has as yet been bought for these concerns, although they occasionally order a single item for special work. Wood-working machinery plants have difficulty in keeping up with orders. Makers of punching and shearing machinery and plate bending rolls are unable to keep up with orders from steel plants and shipyard firms.

The Cincinnati Bickford Tool Co. is installing machinery in its new addition in Oakley and will have it in full operation before Oct. 1. A. H. Tuechter is president.

The Standard Electric Tool Co., Cincinnati, has not yet commenced to remove its machinery from its present location at 123 Opera Place to its new plant on Western Avenue. The new plant is being overhauled and new equipment will be installed and it will probably be operated as a branch plant until after the winter.

The Long & Allstatter Co., Hamilton, Ohio, is making good progress in the construction of its new foundry. Nearly all of the necessary equipment has been purchased. F. C. Perry is general manager.

The addition to the plant of the Cincinnati Pulley Machinery Co., Covington, Ky., is in operation, but a few additional machines will be installed.

The Liberty Tool & Production Co., Dayton, Ohio, has tentative plans under way for increasing the capacity of its plant. H. L. Beeler is general manager.

It is rumored that the National Cash Register Co., Dayton, is buying machine tools for the manufacture of army pistols.

It is reported that two additional warehouses will be constructed at Columbus, Ohio, by the War Department, estimated to cost \$800,000.

The Warm-U Automobile Heater Co., Columbus, has been incorporated with \$25,000 capital stock by C. N. Bowen and others.

The Streine Machine & Mfg. Co., New Bremen, Ohio, has completed an addition to its plant. It is in the market for a 18 or 20-in. lathe, with 8-ft. bed, with compound rest. Frank C. Streine is president.

The Minster Machine Co., Minster, Ohio, has started on foundations for an addition to its plant that will increase capacity nearly 50 per cent. A. H. Herkinhorff is president.

The Hamilton Machine Tool Co., Hamilton, Ohio, is in the market for a 50-ton traveling crane.

The Hoekin Can Co., Cincinnati, Ohio, is inquiring for a large drawing and stamping press.

Indianapolis

INDIANAPOLIS, Sept. 9.

The Specialty Gauge & Tool Co., Indianapolis, has been incorporated with \$10,000 capital stock to manufacture tools. The directors are John C. Ertel, Jr., M. Ertel and Edward Ertel.

The Midwest Engine Co., Indianapolis, has taken out a permit for two reinforced concrete brick and steel additions, 1 x 465 ft. and 25 x 100 ft.

The Teetor Piston Ring Co., Indianapolis, has changed its name to the Teetor Mfg. Co.

The Linkhart Mfg. Co., North Vernon, Ind., has been incorporated with \$20,000 capital stock to manufacture separators and graders. The directors are Ernest H. Lange, Paul Reidelberger, Earl G. Ralph and John W. Linkhart.

The Automatic Sprinkler Co., Indianapolis, has been incorporated with \$10,000 capital stock. The directors are Walter G. Glass, Louis Layton and Thomas H. Sheehan.

St. Louis

ST. LOUIS, Sept. 9.

The Argyle Gin Co., Smithdale, Ark., P. B. Russell and M. A. Morrison interested, is in the market for about \$10,000 worth of power plant and cotton gin equipment.

The Mississippi Industrial Institute and College, Columbus, Miss., is in the market for about \$25,000 worth of power house machinery.

The National Safety Car & Equipment Co., St. Louis, George H. Tontrup and others interested, will equip a plant for the manufacture of safety car devices.

The Lincoln Steel & Forge Co., St. Louis, W. J. Beattie, engineer, Columbia Building, will equip a machine shop and is in the market for machinery.

The Ashley Lumber Co., Hamburg, Ark., is reported in the market for about \$40,000 worth of equipment.

The Mid-West Wire & Iron Co., Kansas City, Mo., will rebuild its metal-working plant recently destroyed by fire with a loss of \$50,000.

The Talbot Reel & Mfg. Co., Kansas City, Mo., will double its manufacturing capacity for making gun sights for the Government. About \$250,000 will be expended.

The Peabody Battery & Starter Co., Muskogee, Okla., will install about \$10,000 worth of additional equipment.

The Enid Auto Shop, Enid, Okla., E. B. Wentworth and others interested, is in the market for about \$10,000 worth of machine shop equipment.

The Terminal Railroad Association, St. Louis, will erect a mechanical coal hopper and require about \$20,000 worth of equipment.

The Southern Railway & Light Co., Natchez, Miss., is in the market for 500 hp. of boilers and other power plant equipment.

F. A. Parker, Eureka Springs, Ark., is in the market for gasoline engine equipment and other machinery.

The Stern Foundry & Machine Co., New Orleans, La., will build an addition to its plant to cost about \$15,000.

Work has been started on the first of the two shell manufacturing plants which are to be constructed by the Laclede Gas Light Co., St. Louis. The Austin Co., Cleveland, has the contract for the first plant.

The Key Boiler Equipment Co., St. Louis, contemplates increasing its capitalization from \$30,000 to \$1,000,000 and making extensive additions to its plant at Lansing, Mich.

The National Safety Car & Equipment Co., St. Louis, has been incorporated with a capital stock of \$25,000 to manufacture street car devices. The incorporators are George H. Tontrup, Edward Bronenkamp and Thomas G. Harkins.

Texas

AUSTIN, Sept. 7.

The Navy Department has revised its plans for the construction of a seaplane station at Galveston, and instead of costing about \$2,000,000 as originally contemplated it will involve the expenditure of approximately \$3,000,000. The plant will include a machine repair shop.

The City Council, Stamford, will award contract soon for the construction of a dam on the Clear Fork of the Brazos River and the construction of a waterworks plant, involving an expenditure of about \$440,000.

Armour & Co., Fort Worth, will build a four-story addition to its cold storage plant.

The Chino Extension Mining Co. will install an air compressor, drills, air-driven hoist and pumps at its Old Log Cabin mine, near Santa Rita, N. M. C. A. Patterson, 110 South Dearborn Street, Chicago, is interested.

California

SAN FRANCISCO, Sept. 3.

Carelessness in loading and transporting machinery is far beyond the normal and important work is being held up through the necessity of sending parts back to mills in the East to be repaired or replaced.

The Best Steel Casting Co., San Francisco, is completing two additions to its shops, 65 x 240 ft. and 30 x 750 ft., which will about double the capacity of the works.

The Forrest Forge Co., San Francisco, is about to install in its Oakland branch an 800-ton United Engineer press in addition to its 1000-ton press and also add two 3400-lb. steam hammers to the seven now in operation. It is also building an addition to its machine shop, 50 x 200 ft., which will add 50 per cent to its floor space.

The Standard Auto Body Works, Los Angeles, has leased a two-story factory, 50 x 90 ft., to be erected at 1501 Central Avenue for a new manufacturing plant.

The Pacific Marine & Construction Co., San Diego, recently organized under the name of the Pacific Marine Corporation, with capital of \$1,000,000, has filed plans for a general shop building for machine work, forging and other operations, and office building to cost about \$118,000. A permit has also been taken out for the construction of a pier and bulkhead at the plant to cost \$325,500.

The Llewellyn Iron Works, 1200 North Main Street, Los Angeles, will make improvements in its machine shop costing about \$5,000. Construction has commenced on a new two-story, reinforced-concrete office building, 77 x 130 ft., to cost \$17,500. It is understood that the present structure will be devoted to the manufacture of engines and other work.

The Madary Planing Mill Co., Kern and H streets, Fresno, will immediately rebuild its wood-working plant recently destroyed by fire with loss of about \$150,000. The new structure is estimated to cost about \$200,000 with equipment.

The E. E. Chapman Co., Ltd., Los Angeles, has been incorporated with a capital of \$30,000 to manufacture signal devices, to be known as the Security auto-theft signal. E. E. Chapman, Albert Andrews and H. G. Miller, Los Angeles, are the incorporators.

The Muller Shipbuilding Co., Title Insurance Building, Los Angeles, has issued bonds for \$100,000, to cover initial construction of a shipbuilding plant.

The Mount Wilson Solar Observatory, Santa Barbara Street, Pasadena, has had plans prepared for a two-story factory, 45 x 90 ft., for the manufacture of optical goods, estimated to cost about \$25,000 with equipment.

The Pacific Door & Sash Co., Los Angeles, has been incorporated with a capital of \$200,000. E. A. Nicholson, C. S. Simpson and J. M. Carpenter are the incorporators.

The Government will commence construction about Oct. 1 on its proposed new marine post on Dutch Flats, San Diego, the initial group consisting of 14 structures to cost \$1,500,000. About \$600,000 will be expended for an electric lighting plant, water systems, etc.

The Pacific Northwest

SEATTLE, Sept. 9.

The labor shortage is extending to every industry, but it is expected that with the release of harvest workers the situation will be somewhat improved. Machine shops and foundries are working to capacity, which could be expanded to meet the urgent needs if more skilled workmen were obtainable.

The Colhasse Shingle Mill, Leavenworth, Wash., was recently destroyed by fire with a loss estimated at \$20,000. C. Colhasse is owner.

Negotiations are being completed by the Esquimalt Ship Co., Victoria, B. C., for the establishment of a shipyard on a site of 44 acres. The initial program calls for six ways. Contracts have been secured for four wooden auxiliary schooners of 3500 tons each.

A machine shop and gas engineering building will be built in Vancouver, B. C., in connection with the vocational work for the Invalid Soldiers' Commission. The two buildings will cost about \$7,000. A machine shop and gas engineering building will also be erected at Fairview, the expenditure to be \$25,000.

The South Bend Shipyard Co., the Willapa Harbor Iron Works and John W. Kleeb, South Bend, Wash., contemplate the consolidation of the three firms into one incorporation. The plan provides for enlarging the iron works to treble its present size and move it to the Kleeb site, where a large sawmill will be built. The shipyards will be enlarged and new ways provided.

The Northwest Steel Co. and the Hesse-Martin Iron Works, Portland, Ore., have made arrangements whereby the latter company will use the larger portion of its capacity in fitting out steel vessels until late in 1920. It will continue the operation of some special machines and equipment for Government ship work.

The Associated Engineering Co., St. Johns, Ore., has purchased the plant of the Specialty Box Mfg. Co. and will make ship tackle blocks and pulleys. A blacksmith shop will be installed.

W. L. Harris, Seattle, has purchased the business of the Olson-Klopf Welding & Cutting Co., 74 West Jackson Street, Seattle, which will be continued under the same name. The plant will be equipped to design, erect and operate hydrogen and oxygen plants and will carry a full line of cutting and welding apparatus.

Canada

Toronto, Sept. 9.

The Frost Wire Fence Co., Sherman Avenue North, Hamilton, Ont., has let contracts for an addition to cost \$30,000.

The Crane Co., 836 South Michigan Avenue, Chicago, has let contract for a three-story, reinforced-concrete brick plant at Lachine, Que., to cost \$600,000.

Lacombe, Alta., will install an engine at the electric plant to cost \$8,000. N. E. Carruthers is secretary.

The Salada Tea Co., 102 St. Paul Street West, Montreal, is in the market for a 5-hp., 230-volt, direct current motor 850 r.p.m., shunt wound.

The County Council, St. Thomas, Ont., will spend \$10,000 on machinery for loading gravel, etc. James Bell, St. Thomas, Ont., is county engineer.

The Canada Flax Mills, Ltd., Arthur, Ont., will commence work at an early date on the erection of a factory to cost \$7,000. It is in the market for machinery, boilers, engines, etc.

The Canadian Consolidated Rubber Co., 201 Ingersoll Street, Montreal, has secured a site and will build a two-story, reinforced concrete and steel factory to cost about \$60,000.

The St. Maurice Foundry Co., Ltd., Three Rivers, Que., will build an addition to its plant to cost \$15,000. C. French is manager.

Containers, Ltd., Toronto, Ont., has been incorporated with a capital stock of \$150,000 by Edward J. Swift, T. Adams, Rupert K. Grimshaw and others, to manufacture cartons, etc.

Authors & Cox, Ltd., Toronto, has been incorporated with a capital stock of \$50,000 by Thomas A. Rowan, 59 Vine Street; Victor H. Hattin, Gertrude Bradford, and others, to manufacture artificial limbs, trusses, surgical instruments, etc.

Beattie McIntyre, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by John D. McNair, Browning Avenue; George A. Robinson, Stuart P. and others, to manufacture electrical machinery, equipment, etc.

The United Auto Sales, Ltd., Toronto, Ont., has been incorporated with a capital stock of \$100,000 by Rupert Grimshaw, 29 Dixon Avenue; Melville D. Grimshaw, Edward J. Swift, and others, to manufacture automobiles, motorcycles, engines, machinery, etc.

Ellis & Howard, Ltd., Kitchener, Ont., has been incorporated with a capital stock of \$40,000 by Frank O. H. Samuel F. and Walter H. Howard, and others, to manufacture electrical machinery, equipment, supplies, etc.

The K. & S. Canadian Tires, Ltd., 527 Yonge Street, Toronto, will make additions to its plant at Weston, Ont., to cost \$60,000.

The Dominion Foundries, Ltd., Hamilton, Ont., has let contract for an addition to cost \$74,000.

The Page Wire Fence Co., Hamilton, Ont., contemplates an addition to its plant to cost about \$50,000.

The New Westminster Construction & Shipbuilding Co., New Westminster, B. C., has secured a site on the waterfront and will commence immediately on the erection of a wooden shipbuilding plant.

The Canada Steamship Lines, Ltd., contemplates the erection of a machine shop at Point Edward, Ont., for making repairs to its boats.

Government Purchases

WASHINGTON, Sept. 9.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, as follows: Schenck 5624½, for Norfolk, machine tools, grinders, drill press, engine lathes, etc., opening Sept. 13; 5656½, Boston, grinding machine, Sept. 13; 5657½, Philadelphia, one punch press, Sept. 20; 5683½, Portsmouth, three turret lathes, Sept. 20; 5689½, Washington, one planer, Sept. 20; 5690½, Norfolk, traveling head planer, Sept. 20; 5691½, one roller drill; 5692½, two boring, drilling and milling machines; 5693½, five other machine tools; 5694½, three pit planers; and 5695½, one open-side planer, all five for South Charleston, Sept. 20; 5701½, Philadelphia, shaper, Sept. 20; 5717½, Brooklyn, one gate shear, Sept. 20; 5737½, Hingham and St. Juliens Creek, machines for drilling explosive projectiles, no date; 5738½, South Charleston, one lathe, Sept. 16; 5800½, one lathe, and 5801½, one crank shaper, both Brooklyn, Sept. 20; 5850½, Puget Sound, threading machine, two turret lathes, Sept. 27; 5856½, Iona Island, four electric hoists, no date.

